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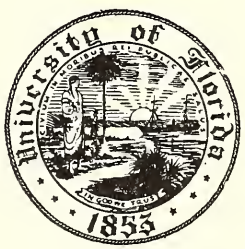

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Readings in Industrial and Business Psychology

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John F. Dashiell was Consulting Editor of this series from its inception in 1931 until January 1, 1950. Clifford T. Morgan was Consulting Editor of this series from January 1, 1950 until January 1, 1959.

Readings in Industrial and Business Psychology

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Preface

In the rapidly expanding field of industrial and business psychology a great many new developments have occurred since the publication of the first edition of *Readings in Industrial and Business Psychology*. The general acceptance of that volume and the urging of a number of its users have prompted the editors to survey the literature in the field and compile an up-to-date collection of articles that would be representative of current thinking and research.

Like the first edition, the revision includes readings in the classical topic areas and, in addition, new coverage in engineering psychology, criterion problems, and organizational behavior. Besides the broadened scope, the present collection is more heavily weighted than its predecessors with articles of an experimental and theoretical nature. This reflects an increase in the number of studies of a more penetrating and scientific character than were heretofore available in the literature.

The inclusion of a considerable number of technical papers was made with some misgivings. The student without some knowledge of experimental design and statistical technique will experience rough going in trying to understand these technical accounts. But the task is not an impossible one and the instructor can and should see that students in this field are prepared to appreciate what the sophisticated industrial and business psychologist is doing. If the field is to achieve respectability, the student and practical business man must become familiar with pertinent scholarly studies even though they are not always highly "readable." Apparently many instructors share this opinion for a sizable number of the more technical articles are included at the suggestion of users of the earlier edition.

The present compilation of 58 articles presented in their original form and selected after an extensive examination of the literature represents wide variations in content, manner of presentation, and writing style. Thus, viewed as a whole, the content of the book does not lend itself to an even and integrated presentation. But the advantages outweigh the disadvantages, in the editors' opinion. The reader has the novel

experience of exposure to a variety of personalities and sources which stimulate critical thinking and ultimate evaluation.

The up-to-date character of the book is reflected in the fact that 50 of the 58 articles in the total compilation were published during 1955 or later and that none goes back prior to 1951. The restricted time span does not mean that important writings did not appear earlier. But this material has been presented in the first edition of *Readings in Industrial and Business Psychology.*

A collection of readings can be issued only if authors and publishers are willing to collaborate. The editors gratefully acknowledge the courtesy of the large number of publishers and authors who have permitted their material to be reprinted in this volume. Specific acknowledgments will be found in connection with the individual selections.

Harry W. Karn
B. von Haller Gilmer

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Introduction

The Psychologist in Industry *

Birth of Industrial Psychology

The science of psychology is about 100 years old, but its industrial branch dates its real beginning with World War I.

The first major contribution of psychology to management problems was in the area of testing. During World War I, about 4 million recruits and officers in the U.S. were tested and classified under the old Army Alpha and Beta tests measuring intelligence and evaluating performances. In 1918 the earliest scientifically controlled effort to develop and measure morale took place at Camp Greenleaf, with approximately 25 military psychologists participating in the experiment.

The Beginnings. Business as a whole was slow to accept the contribution of industrial psychology, save in the area of personnel selection. While industrial application of psychological procedures was tried in isolated industries, the depression soon put an end to any large-scale activities.

The best known of these early experiments was the one conducted in 1927 at the Hawthorne plant of Western Electric Company. The Elton Mayo group who conducted the research began with the sole aim of determining the relationship between productivity and various factors in the work environment. Today almost every executive is familiar with the then startling finding that productivity rose no matter what changes were made in the work scene. Illumination was increased, then decreased, then tampered with but left unchanged. No matter what was done, output took a boost. The experimental group was reacting more to the attention they were getting than to the changes in their physical environment.

Much has been learned about the complicated subjects of morale and

* This study, reprinted with permission from the booklet "The Psychologist in Industry," was prepared by the staff of the Research Institute of America, in conjunction with a special Committee for Public Information, established by the Division of Business and Industry of the American Psychological Association.

motivation since the early Hawthorne experiments. But it was not until World War II that industrial psychology made the real breakthrough. Beginning in 1940 the United States Government recruited psychologists by the hundreds for numerous tasks in the development of military personnel.

Where World War I had brought tremendous advances in testing, World War II brought a wide expansion in the variety of tasks performed for the military. For example—

... testing for specific abilities, such as aviation;
... development and evaluation of training programs;
... measuring human adjustment to high altitudes;
... diagnosing trainability of illiterates;
... development of achievement tests;
... measuring the effects of psychological warfare;
... selection tests for officer candidates;
... measurement of morale in various parts of the world;
... development of objective measures for performance review.

Recent Growth. By the end of the war, the U.S. had developed a unique corps of skilled scientists equipped to apply their knowledge to the intricate problems of the business organization.

Growth of the profession from that point was rapid. Ten years ago only 202 industrial psychologists were registered as Members of the Division of Business and Industry of the American Psychological Association. Today, there are over 700 in that Division—and additional hundreds of psychologists affiliated with other Divisions of APA who are also working in industry. The number of articles on industrial psychology has swelled from a mere dozen or so a year to well over a thousand. Scores of textbooks in the field have appeared within the last 15 years. A decade ago perhaps no more than 50 industrial psychologists were employed in industry. Today, an individual company may employ that many.

The Areas of Concentration

Today the industrial psychologist functions in these major areas:

I. Selection and Testing
II. Management Development
III. Counselling
IV. Employee Motivation
V. Human Engineering
VI. Marketing Research
VII. Public Relations Research

Though his contribution in each of these fields has been notable, not enough is known about his work. Several factors contribute to this lack

of public awareness. In the first place, unlike his university colleagues, the psychologist in industry is under less pressure to write. Where the rule for the teaching profession is "publish or perish," the industrial psychologist, caught up in the pressures of business, has little time for publishing. Often too, his work must be kept confidential lest the company lose the competitive advantage that might be derived.

Such research findings as do reach publication usually appear in technical journals only. To date, little of it has been sifted and translated for a more general audience.

Whatever the causes, the result has been misunderstanding or simple lack of information about what he can and cannot do for business, in each of his areas of concentration.

I. Selection and Testing. The industrial psychologist is best known for his work in personnel selection and testing. Even companies that rarely use professional advice in connection with their training, personnel, organizational or marketing problems, often rely on psychologists for an objective appraisal of their executive group, by tests and otherwise.

Psychologists have made definite strides in developing and refining tests. Instruments are now available for measuring aptitudes, intelligence, manual dexterity, technical competence, clerical ability, personality, interests, imagination and many other attributes.

Commercially published, standardized tests have been used by many companies in hiring for lower level jobs and have proved adequate for broad purposes. However, the psychologist often prefers to tailor-make a battery for the company's specific needs. This is a detailed, and more costly, procedure, but many organizations have found it worthwhile.

It is not unusual to use standardized procedures for the bulk of the company's personnel and go all-out on selection for executive spots.

Executive Appraisal. At the executive level, where position requirements are generally quite complex, tests are not likely to play as important a role in the appraisal process. For evaluations at this level, some of the most significant contributions of the psychologist have been in the development of more objective and accurate methods for obtaining on-the-job performance appraisals.

Research has shown, however, that even at this level, certain tests can aid in pin-pointing abilities and personality traits that indicate future potential. The use of these tests is not confined to outside hiring. In fact, the psychologist's most important function in the areas of selection and testing often involves the appraisal of present staff in order to spot characteristics that are not easily observed in the performance of their present jobs.

For example, psychologists were called upon in these cases:

The management of one company, considering the purchase of a competitive plant, retained a consultant to evaluate the managers.

Inventories of management abilities were sought by one company preparing for a major expansion.

Appraisals have frequently been used in individual cases to confirm management's own judgment about a man's executive potential.

It's interesting that even where the psychologist's investigation merely reconfirms management's own evaluations, it considers the investment in the psychologist's services worthwhile.

Contrary to popular opinion, the need to fill a key executive job is not necessarily the right moment to initiate a testing program. It may be important to evaluate the potential of executives before a specific job opportunity occurs. Psychologists believe that by planning ahead and starting in a relatively normal atmosphere a company can avoid the tension that may invalidate test results.

The Value of Tests. Professional psychologists generally avoid claims that testing is a panacea for all selection problems. Management is well advised not to oversell itself on the benefits. Psychologists usually emphasize that selections should not be made on the basis of test results alone. A testing program should be considered merely a way of improving one's batting average. It should supplement, but never replace, management's use of its own judgment in the selection process.

The fact is that the higher up the executive ladder you go, the harder it is to *predict* successful performance. Effective tests can be built for supervisory and lower-level executive positions, but at the upper echelons the psychologist has to depend more on highly skilled, intensive interviewing or on personality measures like the Rorschach and Thematic Apperception tests or other non-job-oriented instruments. The lack of good tests in this area is due, in part, to the fact that more research is needed in analyzing the executive job.

To date, present instruments cannot measure, with sufficient validity, complex skills like the ability to organize information, discover the problems implicit in a situation, anticipate events, or arrive at decisions based on a large number of factors. However, the battery of executive tests now being used by most psychologists, though far from perfected, has real value. It does not pretend to guarantee the right choice, but it can pay its freight by revealing the strengths and weaknesses of present personnel. The individual can then be helped to carry additional responsibilities. In the light of test results, a man can often be guided into assignments in which he is more likely to succeed.

II. Management Development. Management leaders have come to recognize that the use of executive selection techniques is only the first step in the effective utilization of human resources. People, no matter how carefully chosen, still must be trained, especially if responsibility for the supervision of others is involved.

Many evolutionary changes have occurred in Management Develop-

ment objectives and techniques since its start immediately following World War II. Current emphasis has shifted from identifying a small group of high-potential men for intensified training toward rapid promotion to that of helping every member of the management team to be most effective in his current assignment, as well as preparing him for future responsibilities. With this change there has been greater concentration on individual development through on-the-job training based on the principle of learning by doing.

In his role the psychologist in many organizations advises top management and supervisors down the line in such matters as:

. . . *company policy* to foster management development;

. . . *organization planning* for best use of managerial talent;

. . . *executive placement* counselling to match individual's qualifications with job demands;

. . . *supervisory coaching* toward individual development;

. . . *replacement scheduling* to help prepare managers for future assignments;

. . . *communications techniques* to help individuals learn more about various aspects of the company's total operation;

. . . and *group training techniques* to broaden the scope of the manager's business and leadership know-how.

Developing a Program. Whether the psychologist works as a consultant to the company or is employed as a member of its staff organization, he is not directly responsible for accomplishing the objectives of management development. In concept and practice, management development is the primary responsibility of company executives who also are charged with responsibility for achieving the company's operating and profit goals. The psychologist serves as an adviser and coordinator; he becomes the catalyst, helping to realize a company's objectives for management development.

The psychologist contributes to management development in three important ways: first, he is equipped to assist in analyzing development *needs;* second, he is concerned with devising new techniques for both appraisal and training so that managers get help in objective self-evaluation as well as guidance in how to achieve needed self-improvement.

Third, he undertakes to develop research methods for evaluating the change that occurs in people as a result of the program. Do supervisors and executives really adopt new patterns? How and in what areas? Are they really better managers? Do they listen more intently to others? Are they less defensive? And can they really manage others with less strain on themselves and their subordinates?

The Long-range Goals. The real goal of a sound management development program is to increase the effectiveness of the executive group. In

large part, this is accomplished by helping each individual manager develop his strengths and improve his areas of weakness.

After the psychologist has helped to set up a program, the company must see that development efforts are continued lest the initial groundwork be dissipated by time. Many companies rely on the psychologist to assist in the initial stages of planning and setting up such a program. For a sustained, long-range follow-up, the psychologist often will direct the company to other resources, printed material and other developmental aids.

III. Counselling. There is still a wide area of disagreement as to the extent of management's responsibility for providing individual counselling. With the growth of interest in management development, however, it was inevitable that a certain trend toward psychological counselling should emerge. The goal of the counsellor in industry is to help the individual become more effective in the handling of his job responsibilities.

Because purely personal problems can easily affect a man's performance, it is difficult to rule them out of the counselling session. The psychologist employed by industry seldom has the time to accomplish much with the deeper emotional problems. At present, most counselling within industry is restricted to specific situations like adjustment to job change or preparation for retirement.

On a less formal basis, however, the counselling psychologist often may find himself involved in a generalized kind of counselling with the top executives in the company. He may serve as a sympathetic sounding board, and may help the executive over some particular personality crisis. Often he serves the role of an objective trained observer in whom the executive can have trust and with whom he can feel relaxed.

Emotional Problems. The industrial psychologist is not primarily concerned with the therapeutic relationship. However, some clinical and counselling psychologists specialize in industrial problems. They are specifically trained to deal with personality problems affecting an individual's total life experience. They can assist in facilitating whatever personality modifications are necessary to restore an individual to a healthier, more stable adjustment. Within industry, they sometimes provide the mental first aid necessary to overcome the personal problems that interfere with job performance.

However, even the clinical psychologist working in industry will not ordinarily become involved in deeper problems. Those are best left to the private practitioner whose office is unconnected with company sponsorship and with whom the individual can develop a more realistic therapeutic relationship.

IV. Employee Motivation. Ever since the Western Electric Hawthorne study, management has become increasingly sensitive to the important

effects of group attitudes and climate on work performance. Psychologists have learned much about both morale and motivation since this 30-year old study was made.

Today we know there is no simple relationship between morale and productivity. High morale does not necessarily mean high productivity. Much depends on other variables like types of incentives, level of position, nature of supervision and the individual's desire to achieve. Boredom and fatigue have been studied, and periodic rest pauses have been used to improve performance. Other studies of employee motivation have measured the effect on output of employees' participation in setting up their own production standards.

Morale. A wealth of information has been accumulated in the measurement of job satisfaction. In one company, for example, a group of supervisors were trained to involve their employees in all areas of work decisions; another group of supervisors were trained to be authoritarian. Then careful measurement was made of differences in employee feelings, work satisfaction, etc. While the productivity of both groups was increased during the experiment, the group under authoritarian supervision was found to have reached their production levels at the expense of job satisfaction. Employees in this group were found to have not only less satisfaction with their jobs but less liking for their supervisor and for one another. Obviously, this is a high long-term price to be paid for immediate production gains.

Supervision. In another recent study of the effects of authoritarian versus democratic supervision it was demonstrated that work group morale can be achieved by either extreme. However, it was the inconsistent group of supervisors at the middle of the two extremes who were ranked lowest by their employees. Inconsistency was proved to be a greater cause of dissatisfaction than either extreme of behavior. New implications for the training of supervisors were gained as a result of these studies.

Other research projects have concentrated on problems like these:

. . . The kind of supervision that seems most effective for scientific, technical personnel and specialized personnel entering industry as a result of the new technological advances.

. . . The influence of organizational structure on work productivity and job satisfaction.

. . . The importance of consistency in superiors.

Much of the research is necessarily long-range and experimental. Consequently the financial burden can be carried only by the larger company with a sizable budget.

Attitude Measurement. However, even the smallest companies are coming to learn the desirability of gaining a better knowledge of their employees' attitudes. Attitude surveys on a variety of levels are now being

conducted at modest expense by both company psychologists and consultants.

Many companies have found it particularly useful to institute attitude surveys on the following occasions:

After a period of expansion—in order to compare the newer employees with the older.

When safety records, turnover or absentee figures take a jump.

When normal communication channels fail to provide adequate and accurate information.

Psychologists warn management *not* to institute an attitude survey unless they are prepared to do something about the results. People resent confiding their feelings to management, even on an anonymous basis, and then finding that nothing is done to change undesirable practices.

In addition, psychologists caution management against conducting a survey when there are too many sudden, drastic changes or dramatic crises. Union negotiations, distribution of large bonuses, holiday seasons, are not the best times to start a personnel attitude survey.

V. Human Engineering. Human engineering has been defined as "the designing and laying out of equipment with the abilities and limitations of the human operator in mind, to get the greatest efficiency in the man-machine system." The difficulties of matching men and machines started with the industrial revolution and have continued with increasing complexity up to our atomic age. Basically, human engineering attempts to redesign machines so that they can better match man's finite capacities.

From telephone hand-sets to air pilots' controls, engineering psychologists have played a large part in conforming machines to people. A typical result is so simple a device as an improved display board, designed to facilitate presentation of information. Many of the improvements in consumer goods, such as automatic laundry dryers or electric stoves, have been the result of study of the housewife's normal habits.

Practical Research. Current experimental studies may be grouped in the following general areas:

a. Environmental studies. The effects of humidity, ventilation, lighting, temperature, noise, vibration and their influence on employee health, comfort and productivity are characteristic illustrations. The aim is to protect the worker and minimize these hazards to his personal safety and efficiency.

b. Instrument design. Here the human engineer concentrates on the redesign of dials, scales, meters and graphs. The purpose is to make sure that the individual operating any machine will receive the right type and amount of information as clearly as possible.

In general, the psychologist's procedure is, first, to determine what information the operator will need, the speed with which it must be presented and the degree of accuracy required. Armed with this informa-

tion, he might next consider what sense it should be presented to: visual, aural, tactual, or perhaps some combination. Finally, he examines the precise design.

In visual displays, for example, this would involve consideration of such factors as size, shape and design of letters and numbers; location of graduation marks, etc. The common gas meter, an aircraft altimeter, any warning device such as a flashing light or siren, might be subjected to this type of study.

Some typical "human engineered" displays include license plates, street signs, airport lighting systems and runway markings.

These displays have resulted in significant advantages both in time-saving and safety records.

c. Equipment controls. Attention is focused on the physical design of machine controls. Psychologists are working towards making definitive recommendations on the practical size, shape, gearing and direction of movement of different types of controls so as to eliminate confusion and improve performance.

d. Workplace layout. Psychologists are concerned with arranging work sites to fit the physical dimensions of people, to permit them to see all displays, and to make operation of all controls efficient. The problem of fatigue is tackled from two angles: First, controls are posted so that the operator can apply force effectively. Second, he is allowed to change his posture in order to bring different parts of his body into play.

To achieve greater accuracy, control devices on machines are best placed towards the center, straight ahead or slightly to the right or left, and preferably at the shoulder and elbow height of the individual.

Goal of the Human Engineer. Human engineering studies have aimed at:

. . . providing facts on which to base decisions for improving design;

. . . minimizing expensive guesses and costly last-minute design changes;

. . . increasing sales appeal of products by ensuring effective and comfortable use;

. . . reducing the operator's training time and the costs associated with complex equipment;

. . . helping to eliminate costly accidents due to human error;

. . . increasing job satisfaction among users of equipment.

Most important, psychologists working in this area have concerned themselves not only with the whole range of modern machine redesign but with the more complicated aspects of human performance:

. . . man's ability to control complex systems which are constantly changing;

. . . man's ability to monitor tasks; and

. . . man's ability to make decisions.

VI. Marketing and Motivation Research. Marketing research for a long time has been concerned with the traditional problems of checking distribution channels for a company, determining consumer attitudes, analyzing the strength of competitive products and predicting the possibilities for penetration into new markets.

Psychologists, economists and other social scientists have all been involved in providing these market surveys for industry by collecting a proper sample of opinion and reports of behavior regarding present and potential purchases of their clients' products.

Research Design. The general outlines of their procedures may appear deceptively simple or fairly standard. However, unless the study is carefully designed, the results can be dangerously misleading. Experience is necessary to decide on basic questions, such as what constitutes a proper "sample." The survey researcher must know how to achieve "representativeness." Just piling up numbers in one economic level of the population or in one geographical level can lead to disastrous results for a company aiming at a broad market. Today, detailed statistical analyses of population and geographical areas come to the aid of the marketing researcher, helping him develop a sample from which conclusions can be drawn that will hold for a whole population.

Another major step is the working out of a questionnaire that will provide the information sought by the company. Mailed or personal interviews may be arranged. Finally the data are analyzed and a report written to assist management's decisions about the future of its product.

Motivation Research. With motivation research, psychologists have added a new dimension to the traditional marketing research plan. This is an attempt to probe consumer attitudes at a deeper level than that usually obtained by responses to simple questionnaire items. Contrary to the overplayed concept of the "Hidden Persuaders" there usually is no dredging of the unconscious. Instead the psychologically-oriented marketing researcher attempts to tap the more subtle attitudes exerting an important effect on purchasing behavior. Techniques such as depth interviewing, word association, picture matching, completing sentences, can all be adapted to exploring consumer attitudes.

The following list gives an indication of the wide variety of marketing and motivation studies:

Why the small car has suddenly captured the imagination of the American public.

Why rock and roll is most popular in juke boxes throughout the country.

Why one brand name product far outsells another which is objectively of equal quality.

Why it is possible to sell certain cola drinks in lower economic levels while another is more appealing to other economic classes.

Why larger families are once more the style.

Creative use of opinion surveys and market analysis requires more than an identification of consumer buying habits. In one case, the product was stereotyped as "low class" even though there was nothing essentially logical about the classification. The company responded with an advertising campaign showing obviously high social level people using the product. Research disclosed that this advertising campaign was too much at odds with the consumers' own misinterpretation. Where this is so, even the truth will be rejected. The psychologist recommended that the company modify the marketing aims for the product and pitch the appeal to a slightly lower level. The facts had shown that consumer action cannot be forced by mass media.

VII. Public Relations Research. With the growth in the size of the business unit, the problems of communication between a company and its public have become increasingly complex. Industrial psychologists are probing such questions as how to build a favorable "company image" and how to translate good feeling into consumer purchasing.

Studies of the so-called corporate image must take account of the fact that the modern business deals with several publics: employees, customers, local community, stockholders, suppliers, agents and distributors, and potential users of its products.

The task of keeping the image of the company clear and valid among the various strategic subpublics and among the population at large is a continuing one. It cannot be accomplished without keeping track of the many sources of impressions and beliefs about the company.

As experience accumulates, the industrial psychologist is increasingly helpful in bringing psychological devices and insights to the aid of management in the effort to create and maintain a positive reputation.

Industry's Problems in Using the Psychologist

Psychology's introduction into industry is, as yet, too new for the relationship to be a smooth one. Both the psychologist and the business manager have adjustments to make before maximum results can be expected. Both have contributed to misunderstandings. Some of their misconceptions have been overcome; some, unfortunately, still persist.

For one thing, psychology, like other sciences, has its own esoteric terms. Unfortunately, the language of psychology has been adopted by the layman, often with only fuzzy definition. As a result the psychologist is more often quoted than understood. The fascination of the general public with the mysteries of human behavior has added to many misconceptions of the psychologist's role.

Except in companies where actual exposure to individual psychologists has already occurred, many people have only a vague idea of what psy-

chologists do. The misconceptions will have to be corrected before the psychologist can make his fullest contribution to the industrial scene.

Common Misconceptions. The psychologist isn't a mind reader and has no mystic power. He is a scientist equipped with limited instruments that sometimes yield knowledge and sometimes prove unproductive.

The psychologist has no "bag of tricks" or quick remedies that will solve any and all problems. He has a discipline that consists of observed data about human behavior, some highly important hypotheses that are still being tested, and a scientific method of research into the ways people respond to their environment.

This Business of Motivation. Of all the misconceptions surrounding the work of the industrial psychologist, probably the area of motivation needs the greatest clarification. Management is torn between its natural concern about raising the productivity of employees and its fear of being charged with "manipulation." Greater familiarity with the psychologist's concern about the individual might help to reduce unnecessary fear of "brainwashing."

Essentially, what the industrial psychologist attempts to do in the field of motivation is to help the employee come to grips with all the factors in the work situation, including his own welfare, which involves a recognition of how his interests and management's coincide. Much of the psychologist's work relates to satisfying those personal motives that will help the employee adjust to the requirements of a successful enterprise. Obviously, this does no injury to the employees' own best interest.

Psychologists who have studied the ethical questions involved in the practice of their profession draw a sharp line between manipulation and motivation. The former they define as a process of deceiving the employee so that he acts against his own interest; the latter they define as helping the employee serve the interests he shares in common with the company.

The Rush for Results. Problems rarely develop overnight. By the time expert help is sought, immediate solutions are unlikely. Yet the psychologist in industry is often hampered by management's insistence on quick results.

Were the psychologist willing to guarantee immediate results and provide industry with ready-made answers, he would undoubtedly find ready support.

However, the responsible industrial psychologist is guided by the standards of his profession. His discipline requires time-consuming procedures, questioning of assumptions, examination of data, and thorough study of a wide number of factors involved in the situation. Many executives have had to learn that this method, seemingly roundabout at the outset, pays off in the end.

Home-grown Diagnosis. In talking to professionals many people have a

tendency to slip into the error of confusing symptoms with diagnosis. Thus, when the physician asks what's wrong, the patient announces that he has "tired blood" or "I think it's my heart." The tactful doctor will merely nod and then methodically make his examination.

The industrial psychologist often finds himself in somewhat the same position. Management decides in advance what's wrong and then calls in the expert to solve "our communications problem" or to develop a "better employee training program" or to "improve morale."

The psychologist, like the physician cannot prescribe a "cure" on the basis of the patient's diagnosis. He must make his own examination of the facts and draw his own conclusions as to the underlying causes.

A company with an extremely high turnover rate may decide that its selection procedure is to blame, when careful review of the situation might disclose that the root of the matter is training. In another case, interviews with employees and supervisors might disclose that an extremely high percentage of the men are the victims of confused and contradictory ideas about their job responsibilities. Instead of a new selection battery, a clarification of job responsibilities may be indicated.

The psychologist working in human engineering often finds that management will come to him with a blueprint and ask for his okay, when actually he can be of most help if he has been brought into the problem in the earliest stages—long before a blueprint is prepared.

When industry sticks to talking about the symptoms and the psychologist is free to diagnose, he is in the best position to work out successful solutions. But no cure can be effective if the basic illness has not been accurately identified.

Closing the Gap. On the part of the industrial psychologist, there may be a temptation to inject laboratory or clinical techniques into the industrial setting. Or he may be inclined to use technical jargon in his discussion with management. These patterns are changing, as contact between business and psychology increases.

When Psychology and Industry Work Together

Industrial psychology has achieved most in those companies where management's expectations were realistic. Given the benefit of management's cooperation and support in working toward a mutually accepted goal, the psychologist has made many valuable contributions. As a result, industry has come to recognize that while the competent psychologist is conservative in his promise of results, he is nevertheless aware of the urgent requirements of business.

Within the company itself, psychological research has improved the adaptation of man to job, increased the insight of management into

morale, motivation, accident factors, productivity, etc. Psychologists have influenced industry's outside relationships, in the areas of public opinion, consumer psychology and community relations.

In every specialized branch of industrial psychology, new achievements and advances are being made. Many of these are less well-known than they deserve to be.

Profit Improvement. While the psychologist's basic interest is human behavior, he can help with management's most basic aim, increasing profitability.

But there is a major difference between the industrial psychologist's and the business executive's approach. The psychologist may see the profit-improvement problem as one of reeducation and restructuring of perceptions. The executive may perceive the issue as a budgeting problem. On the other hand rank-and-file employees may be inclined to perceive any mention of cost-cutting as penny-pinching or even punitive. General acceptance of management's aims requires that each group be educated to see things in proper perspective and to understand its role in the broad setting.

Laying the Groundwork. If the management group themselves are subject to misconceptions concerning the role of the industrial psychologist, then they must assume that the rank and file are subject to similar misconceptions. Failure to prepare employees adequately for the work of the psychologist may undermine his entire effort. Experienced psychologists plan carefully for laying the groundwork before they undertake any large scale program. Arranging for the psychologist to address the employees in group meetings may not only prevent misunderstanding but can provide the benefits of healthy publicity for the aims of the company's program.

Follow-up. A disheartening waste of the psychologist's efforts results when management fails to implement or follow up his findings. Even the temporary presence of a consultant may stimulate immediate improvement. Installation of a management development program often results in immediate, measurable bursts of energy and enthusiasm in the affected group. But such gains cannot be maintained without follow-up. Unfortunately, the psychologist is often blamed for management's failure to provide the long-range implementation of his recommendations.

Retaining a Psychologist. In the final analysis the value that can be derived from any program may depend on the qualifications of the particular psychologist you select. His training and background should equip him to understand your problem; his personality and experience should be suitable to the needs of your organization.

Word-of-mouth recommendation may be your initial contact with the professional. It is always safest to inquire further into three areas of personal qualification:

. . . professional affiliation;
. . . certification;
. . . university associations.

Where to Check Credentials. With rare exceptions, all qualified industrial psychologists are members of the appropriate professional society —e.g., in the United States, the American Psychological Association; in Canada, the Canadian Psychological Association. The A.P.A. publishes an annual directory which lists all members, their university background and experience. Local libraries have this volume. Check further on anyone who represents himself as a psychologist and is not listed in the professional directory.

Some states require certification or licensing of anyone using the title "psychologist." Where certification is necessary, you can usually check with the Department of Education or other appropriate agency.

You can also obtain a list of qualified psychologists in your area by writing to any one of the following:

American Psychological Association, 1333 Sixteenth Street, N.W., Washington 6, D.C.

American Board of Examiners in Professional Psychology, attention Dr. Noble H. Kelley, Southern Illinois University, Carbondale, Illinois.

Canadian Psychological Association, P.D. Box 121, Postal Station K., Toronto, Ontario.

Psychological organizations and consulting firms can be checked through:

American Board for Psychological Services, attention Dr. Karl F. Heiser, 10 East Sharon Ave., Glendale, Ohio.

Profile of a Competent Psychologist. It is well to understand in advance that the reliable psychologist is more likely to underestimate than to guarantee results. He will never make extravagant promises of overnight miracles or short-cut cures.

From the very outset, he will be reluctant to commit himself at all before he has had the time to make his own appraisal of your problem. His procedure is likely to include the following basic steps:

1. Survey of the problem. He will want to have his own look at the situation, usually on the premises of the company.

2. *Cost.* His preliminary inquiries should tell him how much time will be involved on his part and on the part of your staff. Then he presents an estimate of the cost.

3. *Research design.* In his proposal, he should discuss in general terms the steps he plans to take, what company resources he may have to use, and the broad outline of method and procedure. This summary will give you a general idea of the scope of the proposed project.

4. Plans for follow-up. The psychologist should want to check over the results of his program. He will plan your follow-up procedure as well.

Working Arrangement. A variety of arrangements are possible. Depending on the size of the company, the nature of the problem and similar factors, you must first decide whether you need the full-time services of a psychologist or a part-time arrangement. There are virtues in each method. A reliable psychologist will himself suggest which he considers the most advantageous.

For example, many psychologists feel that it is unwise to have a permanent member of the staff conduct an appraisal program. The objection is that a staff psychologist may become too involved in the internal situation. An outside source can offer the double advantage of objectivity and a cross-check of opinions. Most consulting firms that undertake appraisal programs set up a team of highly specialized people whose combined efforts minimize the possibility of error.

On the other hand, for long-range programs of training or studies of rank-and-file job satisfaction, a psychologist who is a member of the organization may be desirable. Some companies prefer to have the psychologist work out the general outline, set up the program and then direct the company to further material which it can implement itself.

Conclusion

Modern industry is heading for a period of change, growth, adjustment—all at a speed heretofore unknown.

The introduction of even the simplest change into an organization may set in motion a pattern of reactions that will reverberate through the whole organization structure.

The industrial psychologist is one of many outside sources to whom industry is turning for help. He can serve an important role:

... by helping management spot individuals who are the potential executives of tomorrow;

... by improving the training and supervision of employees;

... by reducing much of the risk in market forecasting;

... by helping to adapt work, men and machines to each other;

... by assessing public attitude toward companies, their products and their services.

The psychologist cannot guarantee absolute success in all these areas. However, through better understanding between management and the psychologist, a good deal of risk and guesswork can be replaced by insight and knowledge gleaned from patient research.

Part One: MOTIVATION AND MORALE

1. Management and Employee Motivation *

Robert K. Burns

How to motivate men in getting work done remains one of the great unexplored areas of American management. Not enough research has been done in this area, nor has there been enough application of what is already known. However, it is indeed encouraging to note the growing interest in strengthening motivation through better management and investigating what can be done in terms of best thinking and practice.

Certainly, in our economy, motivation is of crucial importance since management control derives from consent rather than coercion and seeks to emphasize individuality rather than conformity. Indeed, of the really critical problems facing the American economy, motivation is the common thread woven through all of them. In the cold war with the Communists, motivation is involved in building understanding and identification among our own people in terms of basic objectives and the operation of our economy. In the long-term fight against inflation and a rising price level, increasing productivity and greater output per unit of input depends in no small degree upon greater motivation at all levels of the work relationship.

In truth, the difference between what men can do and what they do do in a given situation is often reduced to the factor of motivation.

Let us consider briefly the nature and meaning of motivation. Essentially, motivation is made up of two aspects—first, basic needs that individuals have and, second, a conscious effort to gratify and satisfy them. Motivation, then, means directed behavior to satisfy needs—action that is not habitual or customary.

Obviously, not all behavior is motivated. Some actions can be explained in such terms as punctuality, considerateness, tolerance, and the like, which indicate not the ends a man seeks, but rather the ways, the rules, the type of regulation and conduct he follows in pursuing them. The ways in which he pursues his ends and does things may be governed by norms of efficiency and consistency in which case the insights and me-

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chanics, economics and psychology, are particularly useful. Or his actions may be governed by norms and standards of social appropriateness —where the insights of anthropology and sociology are helpful.

Motivation, then, involves a particular type of reason for action of a very specific and directed sort. Motivation starts with basic needs, and it is the needs that help explain the action that is taken to satisfy them.

Broad underlying social and cultural values in America help to influence and determine needs of individuals and their behavior.[1] These must be understood if we are to sense the essence of the motivation process in the work situation. Some of these may be stated briefly as follows:

1. An emphasis upon achievement and success, particularly occupational achievement, the acquisition of intellectual skills and competence, and a tendency to equate personal excellence with competitive achievement measured in terms of income, property, wealth, prestige, and power.
2. An orientation toward action, efficiency, and the practical—with the tendency to view work as an end in itself.
3. A faith in change and progress with a tendency to identify change with progress.
4. An insistence upon equality of opportunity which decries extreme inequality and frowns upon privileges not attained by effort.
5. An emphasis upon freedom as a basic value with an implicit suspicion of centralized authority and a preference for objective and impersonal social controls of behavior rather than bureaucratic controls vested in specific persons.
6. A tendency to judge conduct as right or wrong, ethical or unethical, stemming, no doubt, from early American Puritanism and teachings rooted in the Greco-Roman-Christian tradition.
7. Our combination of natural resources, technological accomplishment, social mobility, and our emphasis upon success and equality, has promoted materialism, a preoccupation with "creature comforts" and needs, and a somewhat materialistic measurement of happiness and progress.

Most Americans share these cultural and social values, and these values in turn serve as the foundation on which they organize their activities and define their need structures and motivational pattern, as well as guide their choice of ends and means.

Let us consider what might be termed the continuum of needs and distinguish some of the basic types that are involved. It will be found that these basic needs affect people continuously but differentially, depending upon the situation in which they find themselves. More important, there is a basic priority of needs that we try to satisfy. Only after 1st order needs have been met, do the 2nd order needs begin to influence and

[1] Robin M. Williams, Jr., *American Society* (New York: Alfred A. Knopf, Inc., 1951), pp. 388–440, and Louis J. Halle, *Civilization and Foreign Policy* (New York: Harper & Brothers, Inc., 1955), pp. 21–30.

dominate our actions. Similarly, after 2nd order needs have been satisfied, then 3rd order needs emerge and exert their force.

1st order or primary needs—which have the highest priority, are, of course, the physical needs. These are of two types: (1) *Physiological needs*—to satisfy the individual's need for hunger he seeks food, for thirst he needs water, for breathing he needs oxygen. This is basically the need to be alive and stay alive. (2) *Occupational needs*—to have in the work situation the necessary heat, ventilation, illumination, cleanliness and safety and health safeguards on the job. Without provision for these, the 2nd order needs cannot operate.

2nd order or situational needs—include four subgroups: (1) The need for *security* and *surety*—both economic and emotional. (2) The need for *opportunity* and growth. (3) The need for *acceptance* and belonging. (4) The need for *recognition* and respect. Taken together the first letters of these four needs—security, opportunity, acceptance, and recognition, spell *soar*—which is what happens to the motivation of men if these needs are met on the job.

Let us review these briefly in terms of their characteristics, ways of recognizing them, and what management can do to help satisfy them.

The need for security and some degree of surety may be both economic and emotional in character. From the economic point of view, individuals seek to meet current needs through maintaining their employment and income. They may also seek to provide for the future in terms of a higher standard of living as well as more security through savings, insurance, pensions, and other welfare programs.

Management can help meet economic security needs through effective programs of wage and salary administration, through its efforts to regularize and stabilize employment and income, and through appropriate employee benefit programs.

Another form of security is essentially emotional and comes from confidence in maintaining acceptable and relatively stable relationships growing out of work requirements as well as relationships with the boss and the organization. The lack of adequate emotional security in extreme cases may give rise to organic disturbances, affecting an individual. In Europe, for example, the executive with ulcers is said to have manager sickness, caused, it is said, not by what he is eating, but by what is eating him.

Management can help meet emotional security needs of employees by adequate and understandable company policies, rules, and procedures; by workable programs of communication; by trained supervision, skillful in employee relations, in human relations, in inaugurating change, and in handling other problems.

The need for opportunity and growth is felt by individuals in varying degrees at various ages in their lives. It is probably safe to say that the

great majority of people have a strong desire to learn, develop, and to become more fully functioning. If they are denied this, like any living thing, they tend to become thwarted, frustrated, and perhaps maladjusted in terms of their attitudes and behavior.

Management can help meet the individual's need for opportunity and growth through careful selection and matching of the man to the job; through effective training, transfer and promotion; through adequate supervision and coaching; and by encouraging individual initiative through the fostering of self-directed self-development.

Few people live or work in isolation. We are all functioning members of the different groups—family groups, religious groups, fraternal groups and work groups—both formal and informal. We seek to satisfy the need to be social and to find worthy group activity by joining these groups and participating in their activities. Some individuals have stronger needs of this type than others, some are more capable of meeting and socializing than others, some have more difficulty in experiencing and satisfying these needs than others.

Management can help individuals meet these needs by effective programs of employment induction and orientation, by careful placement and the congenial grouping of people, by promoting friendliness and cooperation in the work situation, by accepting people and their problems for what they are in terms of trying to understand and help them solve their problems.

In understanding human behavior we have come to realize the importance of the self and how the self-image, the sense of self-esteem and self-worth influences the individual and his actions. We also know that recognition is important to many people—the need to say and do things that will bring them attention, satisfaction, and a sense of appreciation. Many individuals in a work situation try to satisfy the need for recognition and self-respect through directed efforts to improve their position, to increase their power, and to attain a higher status. Similarly, some individuals exhibit strong drives for greater responsibility and power over their own situation, to be more important, to be more independent, and to make people more dependent upon them. Finally, to some individuals the factor of a clear conscience and living and working in terms of a basic personal code helps to explain their individual actions in terms of such standards.

Management can help individuals meet their needs for recognition and self-respect by encouraging unique effort and achievement; by reviewing performance and recognizing work well done; by honors and promotions based on merit; by setting objectives, formulating plans, clarifying job duties, and reviewing systematically their progress and performance.

In summary, we have discussed some basic situational needs of individuals—the need for security, opportunity, acceptance and recognition. These constitute a 2nd order of needs that do not come into operation until those of the 1st order—the physical-biological needs—have been satisfied. After that, and only after that, do they become dominant. When these have been satisfied, the 3rd order or operational needs take effect.

The 3rd order or operational needs—these stem more directly and specifically from the work itself and the individual's relation to it.

In terms of the work itself, most individuals want to know and understand the requirements of the job, what is expected of them, and how they stand in getting it done. This suggests that management should: (1) Formulate and communicate departmental objectives and plans; (2) Clarify the functions and responsibilities of the individual; (3) Review work progress and problems encountered in getting work done; (4) Provide some opportunity to analyze and act on the problems that come up on the job.

Finally there is the need that people have to like their work. For the most part, comparatively little attention is given to trying to match the man to the kind of work he likes to do. There are many cases of salesmen who do not like to sell; of persons bored and frustrated in office jobs who hurry home to their mechanical workshops; those who turn from the routine, monotony, and lack of challenge of the assembly line to after-work avocations, activities, and hobbies to find satisfaction and gratification of their needs.

Yet, it is a truism that people tend to do best the things they like best to do. It is also true that greater motivation will usually result in greater productivity if men have a deep liking and attachment for their work and find fulfillment in doing it.

It should be stated that the 3rd order operational needs do not come into play until the higher order physical and situational needs have been satisfied. For most men, their basic needs for security, opportunity, acceptance, and recognition must be satisfied before the operational needs become pressing and controlling. Indeed, the importance of these operational needs are less apparent than the situational or physical needs. The reason is that we have been so busy trying to satisfy 1st and 2nd order needs—the physical and situational—that the 3rd order operational needs have been relatively neglected even though they influence most of us.

Let us now turn to a brief sketch of the process of motivation and how it operates.

The working of motivation in a given situation begins with the needs aspect. These can be classified, as we have indicated, into three areas or three levels of priority: (1) Physical needs—to be alive and stay

alive. (2) Situational needs—of security, opportunity, acceptance, and recognition. (3) Operational needs—the need for an effective job-man relationship.

In addition to the needs aspect of motivation, the other important aspect is the satisfaction or gratification aspect. By this we mean the extent to which an individual experiences satisfaction and fulfillment of his needs due to effort and action by himself and others.

Different people encounter different difficulties in satisfying their needs in the work situation. Three types of barriers might be indicated:

1. The Can-do Factors—The extent to which the individual possesses:
   a. Intelligence—or overall potential.
   b. Aptitude—or specific potential.
   c. Skill—or developed potential required to satisfy his situational and operational needs.
   d. Experience—or seasoned potential utilized over time.
2. The Will-do Factors—The extent to which the person possesses the required attitudes, work habits, and emotional maturity to be able to satisfy his needs.
3. The Unable-to-do Factors—The extent to which the person finds himself unable to satisfy his needs because of the intrusion of rules, regulations and company policy, interpersonal relationships, interdepartmental considerations, the factor of timing, and other external forces that limit his effort and action.

These factors may support or hinder the motivational process. In certain instances where the individual is incapable of meeting his pressing needs because of limitation on what he can do, will do, or finds himself unable to do, he may experience frustration. This may result in mild forms of rigidity, fixation, and stubbornness toward improvement and change, or signs of regression, immaturity, resignation, and withdrawal.

It should be stated that a condition of frustration precludes constructive motivation. Indeed, frustration and motivation are two opposite and conflicting states. Before a person can be motivated, his frustration must be relieved and dissipated. In facing these barriers to gratifying needs, management can help individuals find substitute satisfactions through the mechanisms of counseling, coaching and communication. Individuals may also learn to live with their problems, to sublimate their goals, and to make acceptable adaptations and adjustments in their behavior. Those who are unable to do this may exhibit maladjusted and maladaptive behavior. This may take the form of chronic complaints, a psychological state of depression, rationalization, hostility, withdrawal, or perhaps even some psychosomatic or organic reactions. In such cases, professional help in the form of psychotherapy and psychiatric treatment may be required.

I would like to conclude that where management wants better motivation, three sets of requirements must be met:

Over-all Organization Requirement. Effective management in terms of

motivation cannot be fully realized unless the organization has established company objectives and plans for reaching them, formulated policies and relationships to carry them out, set up adequate operating budgets and costs to check on operations, and systematically reviewed progress and problems and has adequate plans for developing people to meet their problems.

Appropriate Patterns of Leadership to Motivate Men to Do the Work the Way It Should Be Done. The essence of leadership is getting people to do the work efficiently with greatest possible satisfaction to all concerned. The art of leadership, in the words of a great general, consists in getting people to do what you want done because they want to do it. The key ingredient is motivation—how to understand the needs of people and help see that these needs are satisfied.

The first requirement of leadership is being sensitive to the situation—the people concerned, the problems they face, and the relationships that exist.

The second requirement is flexibility and adaptability to provide the pattern of leadership that the situation demands.

The third requirement is skill—to make the leadership effective.

Leadership is much more than a set of traits. It is a combined pattern of attitudes, values, knowledge, and skill. At one extreme, the leadership pattern may be a very rule-centered and bureaucratic one. At the other extreme, it may be very group-centered and democratic. In between, we find authority-centered or autocratic patterns of leadership and individual-centered or ideocratic leadership patterns.

No one pattern of leadership is necessarily better than any other. On the contrary, each pattern has its place. Indeed, in a given situation, one particular pattern of leadership may be more appropriate than others. The secret of leadership lies in knowing what is needed, when it is needed, and how to provide it skillfully. To motivate men to do the job the way it should be done often requires skillful leadership, the use of differential patterns and approaches, and competence in the techniques appropriate to each.

Most individuals have a need to understand the boss for whom they work, to accept and respect him, and to be able psychologically to work for him and with him. They need to know where they stand with the boss, to communicate with him, and to build a stable, satisfying, and productive man-boss relationship. For different men, the man-boss relationship will take different forms. For those with strong needs to be safe and secure, this may mean a relationship where the individual is quite dependent upon the boss, submissive to his wishes and dictates, and accepting of his direction and even domination. To other individuals who have a need to feel recognized, respected, and independent, an entirely different boss-man relationship may be required to bring out the

best in terms of the man's performance. This we term the leadership pattern and practices required by the situation, and these in turn both support and limit the flow and process of motivation.

An Adequate Combination of Communication and Participation. The communication-participation pattern is a powerful factor influencing the motivation process. Communication is the binder that holds an organization together and makes it possible to coordinate thinking and action. Similarly, participation is a means by which people grow, learn, identify, and integrate their needs and objectives with those of the organization and their leaders. This, in turn, helps to determine the kind and quality of purposeful activity that people undertake.

2. Economic Incentives and Human Relations *

William Foote Whyte

How can a system of economic incentives be made to pay off in higher productivity?

Executives, personnel men, and industrial engineers are coming increasingly to recognize that money is not the sole answer to the problem of worker motivation.[1] As the economic man theory is discarded, there may be a tendency to go to the other extreme, to assume that human relations is *the* thing, that money hardly counts at all.

Many people are arguing the question today: Which is more important to workers, economic incentives or human relations? In that form the question is meaningless and unanswerable. Men are interested in money. They are also concerned about their relations with other men. Offer them

* Reprinted from the *Harvard Business Review,* 1952, **30,** 73–79, by permission of the author and of the Graduate School of Business Administration, Harvard University. The problems treated in this article have been developed further by Whyte and his associates in *Money and Motivation,* New York, Harper & Brothers, 1955.

Author's Note: For helpful criticisms and suggestions on this article, I am indebted to my colleagues in the New York State School of Industrial and Labor Relations at Cornell University, Paul Gordon and Leonard Sayles.

[1] F. J. Roethlisberger and W. J. Dickson with their *Management and the Worker* (Cambridge, Massachusetts, Harvard University Press, 1939) have provided the classic study which, among other things, lays low *economic man.*

a financial reward for behavior that damages their relations with other men, and you can hardly expect them to respond with enthusiasm.

The issue then is not: economic incentives *or* human relations. The problem is to fit economic incentives and human relations effectively together, to *integrate* them. In other words, the pulling power of the money reward will be strongly affected by the pattern of human relations into which it is introduced.

Human Relations in Rate Administration. The problems of applying incentive rates in any complex factory are so many and difficult that we cannot weigh the effect of economic incentives without giving serious consideration to problems of administering the incentive system. A review of some of the common problems in this area will show that practically every rate-setting problem has an important human relations aspect.

How are rates set in the first place? It is now well recognized that rate setting at best is a combination of some measurement and some judgment or guesswork. Where judgment enters in, we are necessarily looking at the relations among people.

We are all familiar with the allowances for fatigue and personal time that are estimated for incentive jobs, and we recognize that these are based more on traditional concepts than on any scientific standards.

When we consider allowances for percentage of efficiency of the operator who is being measured, we run into more serious difficulty. In many plants such allowances are made. The time-and-motion-study man observes a worker for a period of time. He checks the amount of production and the time spent, but then he asks himself: Is this worker producing at about the average speed that should be expected of a man on this job? Perhaps the time-and-motion-study man concludes that the worker is not trying as hard as he should, or is even deliberately holding back, and accordingly estimates an efficiency of 80% or 90%. The rate will then be set not on what the worker has actually produced but on the basis of what he should have produced had he been working at 100%.

In one plant I studied, the workers were convinced that management never rated their time-study performance at 100% but was always making allowances that would justify an expectation of higher performance. In still another plant covered in an unpublished study by Donald Roy, the workers firmly believed that it was impossible to make a bonus on a job unless they had been timed on that job at slower feeds and speeds than they would be able to use after the rate was set.

Where these beliefs prevail, the workers make every possible effort to slow down and add unnecessary motions while they are being studied. The rate setters who know that the workers are trying to fool them must then seek to make an allowance for the amount that they are being fooled.

The question then is: Can the worker fool the time-study man more than he thinks he is being fooled? Or as the workers in one plant put it, "You've got to screw him, or he'll screw you."

This problem of allowances for efficiency would be serious enough even if the time-and-motion-study people had unlimited time in which to make their studies. In practice we usually find that, while there may be certain jobs which will be run for a long period and thus afford the time-and-motion-study men ample opportunity to make their studies, there are many jobs which involve such short runs that extensive studies are too costly to undertake, as well as not being feasible in the time allowed. Rates set for such jobs are particularly likely to be subject to the distortions of worker efforts to fool the rate setter and rate-setter efforts to compensate for the fooling process.

Problem of Rate Changes. The problem of rate changing must be recognized as a very real one and not simply the result of worker misunderstandings.

Workers expect management to revise upward a rate that has been proved to be too tight. Can managers similarly expect workers to accept the downward adjustment in a rate that has been set too loose? The *Supervisor's Guide to General Electric Job Information* is interesting on this point. Note the following paragraphs:

> The fact that rate setters sometimes have been wrong and rates have had to be cut should be faced squarely by the supervisors.
>
> No rate setter is perfect. However, it must be pointed out that these occasional mistakes are made on the up side as well as on the down side. No employee thinks it is wrong to adjust a rate upward when a mistake on the down side has been made.
>
> There should be just as fair recognition of the necessity and right to make a downward adjustment in a rate as an upward adjustment. [p. 51]

This statement has an eminently fair and reasonable sound. It certainly seems just as fair to change rates set too high as it is to change rates set too low. But in practice how does management discover that a "mistake" has been made in rate setting? Workers have the impression that this discovery will take place only if they turn out exceptionally high earnings on the job. In fact, I know of cases where the industrial engineers were under instructions to take a new look at any job showing earnings over a certain figure. As to whether rate changes were then put into effect the record is not clear, but the regular appearance of these incentive engineers to check unusually high earnings could hardly have failed to create the impression that it was dangerous to go beyond a certain quota.

If we move from possible "mistakes" in the rate-setting process to consider changes in job methods and content, the picture becomes still more complicated. Most union contracts provide for changes in rates based on changes in job methods and/or content. But we usually find

the qualifying adjective of "substantial" or "major" describing the change. It seems generally agreed that management should not be allowed to change a rate on the basis of a trivial change in the job. If this were allowed, then management could make some trifling change in any job as an excuse for setting a new rate. In fact, I have heard workers in some plants charge that this was exactly the excuse that management manufactured and used.

If we pass over a few cases of sharp practice where changes seem clearly to be introduced in order to justify rate cutting, we still come face to face with major questions of judgment. When does a change become a "major" or a "substantial" change? It is obvious that two men of equal goodwill and sincerity can hold different opinions on this point for many cases.

There is the further troublesome problem of a series of minor changes. It often happens in industry that a job will be modified step by step over a period of months or even years. No single change in itself would qualify as "major" or "substantial," and yet the sum total of these modifications might change a rate that was average in earnings to one that was very loose. At what point in the series of minor changes should management be allowed to intervene with a new rate?

Even if all parties agree that the change in the job is so substantial that a new rate must be set, the problem is still far from a solution. Let us assume that the old job was yielding incentive earnings of 50% over base pay. Let us assume that the average earnings figure on other incentive jobs is only 30% above base. In setting the new rate for this group of workers, should the rate setter aim at a 30% or a 50% bonus?

The workers on the job and their union officers will naturally argue that the new rate should provide earnings equivalent to those under the old one. The management may well feel that the old rate was out of line with the general plant picture and that earnings on the new rate of 30% above base are quite adequate. So even if we assume that the rate setter would be able to predict accurately the earnings possibilities of the job—and we have seen how risky this assumption is—there is no easy answer to the question of what earnings he should aim to make possible.

Worker Sentiment and Rate Acceptance. If X argues that a certain desk is three feet long and Y argues that it is four feet long, it is a simple matter to test the statement of each by the operation of measurement with a ruler. We can then tell whether X or Y is correct or by how much each of them is in error. We can do this because the question is purely a factual one and the operation for determining the answer is one that is universally accepted in our culture. We recognize that it is futile to argue such differences of opinion when the measuring operation provides the answer.

Some incentive engineers wish that people would accept their measuring operations in the same way. But more sophisticated engineers, and others who are familiar with these problems, recognize that the operation of measuring the length of a desk and the operation of measuring work performance for rate setting present drastically different problems. In the rate-setting case, we operate with a ruler that is flexibly adjusted to a variety of allowances, and we find little agreement as to what this ruler is and how it shall be used. At almost every point in the rate-setting process, we come upon elements of personal judgment that cannot be disguised as simple questions of fact.

This does not mean that the labor-management conflict on rates is insoluble. We need not conclude that judgments and opinions can never be accepted as a basis for people's working together. In fact, in any sort of organization people must learn to adjust themselves to the opinions and judgments of others. We must ask, however, under what conditions the judgments of one party in labor-management relations will be accorded reasonable acceptance by the other party.

If we put the problem in this way, it becomes clear that conflict over incentives cannot be resolved simply through better training and skill in the rate-setting process. The elements of judgment are so large that, where there is mistrust between the parties, it inevitably follows that the union officers and workers will not accept rates set by management as having been figured in good faith.

It is unrealistic to expect a condition of such skill on the part of rate setters and such mutual trust that all of the rates set by management will be accepted as reasonable by the workers. But unless there is a widespread feeling through the plant that most of the rates are fair, we cannot expect the workers to go out and produce at anything approximating their abilities. When they distrust management, they will hold back at a certain safe quota point on loose rates, and they will hold back much further on tight rates in order to fight against management for a change in rates.

Worker response to the incentive system thus depends not only upon the actual financial rewards but upon the setting of interpersonal sentiments in which these rewards are offered. Where mistrust between the parties persists, worker response to financial incentive will be halfhearted.

Illustrative Cases. The relationship between worker-management sentiments and response to the incentive system may be illustrated from an actual case,[2] the main points of which can be briefly summarized as follows:

The case came up at a time of intense antagonism between management and union in the Inland Steel Container Company's Chicago plant.

[2] For full details see my book: William Foote Whyte, *Pattern for Industrial Peace* (New York, Harper & Brothers, 1951), pp. 67 ff.

It involved a grievance concerning a change in rates on two jobs on a particular punch press. This punch press blanked out covers from sheets of steel to be used on the pail line. When the job was first run, there was a tendency for the cover pieces to stick to the machine; the operator then had to tap them loose, which slowed up the machine considerably. One of the workers on the job connected an air hose to a compressed-air connection so that the hose would blow air upon the covers from above to push them loose onto an inclined plane out of the machine.

This change had been in effect for some time without any change in rates when a time-study man observed it and consulted the operator about it. The time-study man reported the matter to the engineering department, which installed a metal pipe to blow air on the underside of the punch press. Management claimed that this was a major improvement in machine and method justifying a revision in the piecework rate, and the price was thereby reduced by 9 cents a thousand pieces on one job and by 11 cents a thousand pieces on another. The worker in question and all the union people were incensed at this change. One of them said, "They held us up on that just as if they had stuck a gun at us. That's what I thought then and I still think so."

The union officers charged that management had cut the rate on a punch press job in violation of the contract. They seized upon this grievance as representing the most outrageous example of unprincipled and oppressive management action. The case was argued heatedly through the first three steps of the grievance procedure.

The union claimed that blowing the air from the bottom instead of from the top was simply an excuse for rate cutting and was therefore not justified. Furthermore, the original idea had come from a worker and not from management, and the job already had been run with an air hose for some time.

Management argued that the rubber air hose never worked properly and had been disconnected for some time before the metal air hose was put in the new position. Therefore, this constituted a major change, which justified a restudy of the job. Furthermore, management claimed that earnings on this job (which was run very seldom, anyway) had increased since the rate change. In the over-heated situation which then prevailed, no one on the union side would pay any serious attention to these management arguments.

It was perfectly clear by the time of the third step in the grievance procedure (the personnel manager's decision) that top management would stand by the new rate. The contract provided that rate grievances were not subject to arbitration. The workers took this to mean that management could cut rates anywhere in the plant at any time, with no recourse open to the union. The executives recognized these fears but felt they were unjustified, since top management was firmly opposed to rate cutting. The union officers did not anticipate any wholesale cutting of rates, but it then seemed possible that management might take an inch here and an inch there until the whole rate structure was in jeopardy.

The fourth step of the grievance procedure called for a meeting of top management with the international representative and the grievance committee of the union. Since the union was reassigning its international representatives at the time this grievance was being processed, there was a delay of more than six months between the third and fourth steps of the procedure. Within

this period, union and management met together to negotiate a new agreement. Both sides went in expecting a strike, and the negotiations teetered on the brink of collapse through eleven tense meetings over a period of three months. Finally they not only avoided the strike but worked their way through to establish the basis of a harmonious adjustment.

Following the signing of the new agreement, the parties met together to discuss certain common problems and to clear up a backlog of top-level grievances. At this point, 22 grievances were disposed of in less than an hour, with adjustments being made on both sides. Here the air-hose case which had been such a center of controversy reached its end in two minutes of discussion. The management representative simply cited figures to show that earnings on the job were higher following the rate change, and the international representative and his committee then immediately agreed to withdraw the grievance.

What had happened between the third and fourth steps in the procedure? In that interval the facts and figures of rate setting had not changed. But men's emotions are just as "real" as facts and figures, and it was the emotions that had changed decisively.

We can understand this case only if we view it symbolically. Before the adjustment of relationships, the air hose had been one of the key symbols of the conflict. For the workers and union leaders the case had symbolized the hatred and distrust they bore toward management. It was evidence to them that management was unfair and ruthless. So long as they continued to believe that management was unfair and ruthless, the case could have no other meaning to them, no matter what logical arguments were presented to them. But as soon as relations were reorganized so that the hatred and distrust were beginning to be dissipated, there was no longer an emotional need to hold on to that symbol of conflict. It then became possible to treat the case in terms of facts and figures, and by that time it was hardly worth bothering about.

This statement brings us back to the observation made as long ago as 1913 by one of the pioneers of scientific management, Frank Gilbreth:

> It should be stated here emphatically that there is nothing than can permanently bring about results from scientific management and the economies that it is possible to effect by it unless the organization is supported by the hearty cooperation of the men. Without this there is no scientific management.[3]

At that time the incentive engineers schooled in scientific management were implicitly assuming that the "hearty cooperation of the men" existed and that the problem was to work out adequate systems of measuring effort and productivity. Experience has subsequently demonstrated the validity of Gilbreth's point, that a system of economic incentives will work

[3] Frank Gilbreth, "Units, Methods and Devices of Measurement Under Scientific Management," *Journal of Political Economy,* No. XXI (July 1913), p. 623. (I am indebted to Georges Friedmann for drawing my attention to this.)

badly or well according to whether it fits into a situation of worker-management cooperation or is injected into an atmosphere of conflict.

This suggests that no mere refinements in traditional incentive engineering techniques will cope with the problem of eliciting cooperation. We need first to determine the conditions under which cooperation can be stimulated before we can fit our incentive systems to those conditions.

Incentives and Organizational Structure. The harmonious relations upon which effective financial incentives depend are determined in part by the way in which the incentive engineering activities are fitted into the pattern of human relations within management and between management and the union. This may be illustrated by another aspect of labor-management experience at the Inland Steel Container Company's Chicago plant:

> During the period of union-management conflict in this plant the industrial engineer had been free to move about the various departments and make any studies or observations that interested him. He set rates on new jobs without the approval of the departmental foreman and without any consultation with the union. When the industrial engineer judged that job content had been sufficiently changed, he made new studies and instituted a revised rate. Under this procedure, the rate-setting activity was the focus of much of the union-management conflict.
>
> As the over-all relations between union and management improved, certain important changes in the rate-setting activity were introduced. Under the new procedures the industrial engineer must have the written permission of the general production supervisor before he enters a production department for the purpose of making any studies or observations. When he enters the department, he must first show this authorization to the foreman and to the union steward and explain to them the purpose of his visit. Before the new rate or rate change becomes official, it must have the approval of the foreman and the general production supervisor. The rate is discussed informally with the steward before it is put into effect. If the steward feels that the rate is unfair, management has the opportunity to take this union point of view into consideration before making a final decision.
>
> The union's approval is not required, but the management officers recognize that they have much less trouble with a rate when there is an opportunity for prior discussion than when the union can only be heard through the filing of a grievance. A grievance is, of course, an appeal against a management decision. Especially in the rate-setting field, it presents awkward problems for the executive who often faces the choice of standing by a rate that workers believe to be unfair or of reversing his industrial engineer and running the risk of discrediting the whole rate-setting activity. Management and union people alike believe that these new procedures on rate setting and revision are great improvements. The conflict over rates has virtually disappeared. Slowdowns to exert pressure on rates have ceased, and productivity has risen to record high levels.[4]

[4] William Foote Whyte, op. cit., pp. 136 ff.

What lesson can we draw from this case? The particular procedures involved here might not fit the needs of other situations, but the general conclusion is clear: only when the rate-setting activity is *effectively integrated* into the pattern of supervision and union-management relations will workers respond strongly to financial incentives.

Financial Incentives and Job Evaluation. We see another aspect of the integration problem when we examine factories having both piece-rate and job-evaluation systems.

In recent years personnel men have been devoting untold man-hours of effort to setting up systems of job evaluation. This has involved a careful study of all the jobs in a given plant, an assessing of the degrees of responsibility, skill, difficulty, and importance of the jobs so that they may be rated and compared to each other. Great effort has gone into arranging an orderly scale of jobs and setting wage rates so that the jobs that are higher on the scale will pay the worker more money than those at lower points.

When the job-evaluation program upsets traditional relations among jobs, workers and union officers protest, of course. They may object to the methods used by management in job evaluation, they may object to certain of the conclusions drawn, and they may express a desire to participate in the evaluation process. However, all these are objections to the means and methods used, and not to the general objective. Workers and union officers would agree that it is important to have an orderly arrangement of jobs so that the individual can place himself in the social system of the plant. They also believe firmly that the jobs which are evaluated higher should pay more than the jobs which are evaluated lower.

It is important to recognize that workers, union officers, and management are not dealing here with a technical problem alone. The decisions made regarding the arrangement and relative values of the various jobs tend to place the jobs in terms of a prestige scale in the plant. We are talking about what the sociologist would refer to as a *status system.* All our work in sociology suggests that the status system of an organization is an exceedingly tough organism. It is tough in the sense that changes are not readily introduced into it, and also in the sense that when changes are introduced, serious repercussions may take place.

Passing over for now the many difficulties that may arise in developing and installing a job-evaluation program, let us look at our basic problem in terms of a simplified example:

Let us assume that management has developed a job-evaluation program involving labor grades I through X. Each job in the plant has been assigned to one of these labor grades, and wage rates have been set accordingly. Let us assume furthermore that, while there are minor disagreements regarding cer-

tain jobs, on the whole the system of job evaluation is in accord with the viewpoints of workers and union officers concerning the prestige or relative value of the jobs.

So far all is smooth sailing, but at this point management decides to introduce individual and group incentives on various jobs. According to the nature of the jobs, there are certain ones to which economic incentives can readily be applied, whereas there are others (for example, service and maintenance activities) where no measurement of production is possible by conventional methods, and therefore no incentive rates can be set.

Let us look then at Department X where there are men working on jobs in labor grade V and on jobs in labor grade VI—and the men are in close contact with each other. Now suppose the jobs in grade V are put on incentive, whereas the jobs in grade VI cannot be. Then suddenly we have a situation where men on job V are earning more, and perhaps substantially more, than men on the jobs in the higher classification.

Or suppose that jobs in both grade V and grade VI are placed on incentive, but the rate on job V proves much looser than the rate on job VI. Here again, the men in the lower classification are earning substantially more than their fellows at the higher level.

What happens in such circumstances? I have noted all of the following reactions in a variety of situations:

(1) The men in labor grade VI become highly antagonistic toward management since they feel that it is not fair for them to receive less pay than the men who are below them on the job-evaluation scale and in status. This may also lead to political conflict within the union in which the grade V and grade VI men are arrayed against each other.

(2) Men in labor grade V do not want to be promoted to jobs in grade VI. This may create difficulties for the company in manning the positions in grade VI.

(3) If men in grade V are dependent upon the men in grade VI for cooperation in the work process, this cooperation is likely to deteriorate. In some cases, we find the men in grade VI having to do additional work because of the increased production of the incentive workers. If this additional work is to be done without extra compensation, the men in grade VI raise complaints with the union and with management.

(4) Where the jobs in grade VI are not on incentive, the grade VI workers try to pressure management into some indirect sharing arrangement in the increased earnings of the incentive workers. Where the men in grade VI are on incentive but have a much tighter rate than the men in grade V, the grade VI men will do their utmost to pressure management into loosening their rate. The pressure may take the form of slowdowns or perhaps even work stoppages.

Are the problems described in this hypothetical case exceptional? On the contrary, in the plants I have studied they seem to be everyday problems. Such problems inevitably arise when an individual or group incentive program is introduced into a complex industrial plant. Sophisticated management people learn to expect some of these difficulties and

beyond that can only hope that the disturbances will be scattered about the plant and that the disaffected employees will not be in a strategic position to tie up the entire plant.

We have here, it seems to me, a remarkable paradox. Management brings to bear all the knowledge and techniques of modern personnel management in order to develop a system of job evaluation. On the other hand, management brings to bear all the knowledge and techniques of industrial engineering in order to develop an incentive program. The two systems then run head on into each other with all the attendant confusion and friction I have described.

The conflict between incentive rates and job evaluation seems to reflect, in part, a lack of coordination within the management structure. Job evaluation is often handled by the personnel or industrial relations department, whereas incentive rates are usually set by an industrial engineering group that fits into some other department. Thus we have not only competing systems but competing management groups applying the competing systems. The confusion and conflict arising from this condition are difficult to exaggerate. Many executives and personnel men are well aware of these difficulties, but solutions have been hard to find.

Conclusion

This conclusion takes us back to our starting point. Systems of financial incentives in industry today probably yield a net gain in productivity, but most of them fail to release more than a small fraction of the energy and intelligence workers have to give to their jobs. Even when the financial incentive yields higher productivity, it may also generate such conflicts within the organization that we must wonder whether the gains are worth the costs.

What can management do to meet this problem? Certainly I can offer no neat "packaged" solution. I can only seek to point out a more effective way of approaching the problem.

The setting of incentive rates has been traditionally considered a *technical* engineering problem. When difficulties arise, it has been customary to blame them upon failure to do the job according to accepted, *technical* standards. Now at last perceptive managers, engineers, and personnel men are recognizing that the problem has important human relations aspects that cannot be resolved through the enforcement of any technical standards. But all too often the insights and analyses of human relations come in only to mop up the spilled milk of the incentive engineering activity. At this late stage even the most skillful applier of human relations knowledge will be hard pressed to make a constructive contribution.

Management should recognize that financial incentives are both a

technical engineering and a human relations problem. The two aspects are so intimately intertwined that it is impossible to separate them in action. Therefore management should not be satisfied with a planned engineering program and a catch-as-catch-can human relations program. These activities should be planned together and integrated in action.

Management might also consider the desirability of adopting a more experimental approach to the incentive problem. American management has been noted for its daring innovations in technology and applied science, but in the field of incentives most managements have been content to refine and polish systems that were devised many years ago. Variations are introduced, to be sure, but only a few managements have struck out with experimental boldness to develop a more effective integration of financial incentives and human relations.[5]

Finally, the management that attempts to reexamine its incentive program and develop a new approach needs to focus research on worker reactions to financial incentives. In-plant studies suggest that the field is full of confusion. When an incentive system works badly, management explanations are usually a combination of half-truths and folklore. Even when a system works well, the explanations are likely to be so misleading as to make it impossible to generalize from one case to the next. If we are to have generalizable knowledge in this field, we shall need more searching analysis of worker reactions to incentive systems.

If financial incentives are to be used in the future with full effectiveness, management decisions must be based upon research and experimentation designed to devise an integrated program of incentives and human relations.

[5] For experiments toward developing new types of incentive programs, note particularly the work of Joseph Scanlon of the Massachusetts Institute of Technology. For a popular account, see Russell W. Davenport, "Enterprise for Everyman," *Fortune,* vol. **XLI,** No. 1 (January 1950), p. 55. The Scanlon plans should not be accepted as panaceas but should be considered important experiments deserving careful study.

See also my case studies: "Incentive for Productivity: The Case of the Bundy Tubing Company," in Schuyler Dean Hoslett, Editor, *Human Factors in Management* (Revised Edition, New York, Harper & Brothers, 1951), p. 269; and "Union-Management Cooperation: A Toronto Case," *Applied Anthropology* Volume **6,** Number 3 (Summer 1947), p. 1.

3. Motivation in Management: A Study of Four Managerial Levels *

Hjalmar Rosen
Charles G. Weaver

As Mason Haire (1959) has pointed out, there is really very little known about the motivation of management. Aside from research reports that indicate that the higher the occupational level, the higher the job satisfaction (Centers, 1948; Herzberg, Mausner, Peterson, & Capwell, 1957), the data are very limited. *Fortune* magazine (1947) reported a comparative study of different occupational levels from executive-professional to factory worker with regard to the relative significance of income versus security that indicated that the executive was more interested in monetary reward and less in security than the factory worker. Benge (1959) and Herzberg et al. (1957) report that middle management has poor morale because they have to carry out decisions for which they have no responsibility and are held responsible for subordinates over whom they have no authority. Mullen (1954) reported that supervisors have a great need for information regarding their status and progress on the job, for a role in policy formation, and for a chance to present their ideas for consideration. Houser (1938) reported the following 10 elements as being important to business executives:

1. Knowing whether their work is improving or not
2. Having the opportunity for fair treatment when bringing to their superior things they do not like about their jobs
3. Having a fair opportunity to offer suggestions about their job
4. Not receiving conflicting orders from their superiors
5. Receiving adequate authority to get their subordinates to do what they want them to do
6. Assurance that promotions will go to the best qualified man in the organization
7. Being given adequate information about plans and policies that influence their work
8. Not having their work interfered with by a superior officer in their organization
9. Assurance of pay increases when deserved

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10. Getting the same pay as that for other positions in the organization of equal responsibility and importance

Benge (1959) reported that supervisors in a cross-country survey thought the following were important:

1. Opportunity to get information from a face-to-face contact
2. Receiving sufficient advanced information
3. Having enough authority to carry out their duties and responsibilities

Henry's classic study (1949), although less specific, indicated a great drive toward upward mobility among executives, and Katona (1951, pp. 204–210) in studying executives postulated an identification with organization, i.e., the organizational goals and the goals of the executives become indistinguishable.

In the reported studies there is a tendency to distinguish between various levels of management, although often the classes are so broad and ill defined that it is difficult to distinguish between them. On the surface, such classification seems justified. It is readily apparent that within the management class within a given industrial plant, let alone in industry at large, there is a considerable heterogeneity in status, potential for upward mobility, and specific occupational role demands. Even the supervisory function, so often identified with the management role, does not apply universally to all members of management, e.g., the quasi-professionals who make up the staff specialist category often have no supervisory responsibility. Yet, all members of management operate within the confines of an autocratic structure, and maintenance and improvement of status is dependent upon their performance in carrying out their responsibilities—not upon their extra organizational affiliations such as unions. To what extent then, when analyzing the motivations of management, can one generalize about the "managerial class"?

This study was undertaken with the primary purpose of determining whether or not motivational commonality exists among various levels of management with regard to what managers want from their jobs and the importance that they attach to various job conditions. Of secondary interest was relating the job desires of each class to the general findings previously reported.

If motivational disparity is found to exist among differing managerial levels, then the general tendency to speak of "management" as meaningful, distinguishable classes, motivationally, is justified. If, on the other hand, a motivational commonality is found to exist, even within the relatively restricted realm of this study, then there is some basis for accepting the class as a legitimate unit of study; and perhaps of equal importance, to speculate about the genesis of the motivational commonality.

Method. *Sample.* To eliminate interplant variance, the subjects were selected from a single organizational unit. The company represented one

plant of one of the leading and oldest manufacturers of farm implements and machinery in the United States. The plant employed approximately 2,000 workers and was located in a moderately-sized urban center. In conversations with plant and corporation personnel, it was reported that the plant, until a few years ago, was characterized by severe management incompetence in all managerial levels. To cope with the problem, a general manager was installed by the parent corporation and was given unilateral control of the plant re decisions and policy formation.

The population studied consisted of 155 men, the total managerial force of the plant, excluding the general manager. For the purposes of the study, the men were categorized into four levels with regard to status

Table 1. Twenty-four Conditions of Work Used as Stimuli Items

Area 1. Relations with Superiors
1. Having the opportunity to talk over problems with my superior
2. Knowing whose orders to follow
3. Working under a superior who explains any changes he makes
4. Having superiors who will help me out, but not take over when I get in a jam
5. Working under superiors who judge me solely in terms of merit
6. Working under superiors who delegate as much of their authority as possible
7. Knowing where I stand as far as my superiors are concerned
8. Working under men who attempt to develop their subordinates
9. Working under superiors who recognize the problems involved in my work
10. Working under a man who will take over and do the job for me when I get into a jam
Area 2. Company Practices and Policies
11. Having knowledge of plant plans that affect me and my job
12. Working in a plant where the responsibilities of every supervisor are clearly defined
13. Working for a company that stresses experience more than education for promotion
14. Working in a plant that is operated efficiently
15. Working in a plant that has clear cut, long range objectives
Area 3. Relations with Peers
16. Having the other managers at my level recognize the importance of my work
17. Having knowledge of what others are doing in as much as it may affect me and my job
18. Having mutual cooperation among the managers at my level
19. Working with fellow managers who recognize the problems involved in my work
20. Working with fellow managers who will help me out when I get into a jam
Area 4. Opportunity for Self Expression
21. Having the opportunity to share in plant policy making decisions
22. Being consulted before decisions are made which concern me and my department
23. Having sufficient authority for the job expected of me
24. Having management meeting where everyone can have his say

and job responsibilities.[1] Included were seven top managers, the highest group of managers within the plant, directly under the general manager; 36 middle managers, all of whom reported to top management, including such job titles as: personnel manager, general foreman, accounting supervisor, etc.; 65 staff specialists, e.g., engineers, time study men, methods analysts, etc., who reported to middle management; and 46 first line supervisors (foremen) who were responsible to middle management.

Each man regardless of level was evaluated by his superiors in terms of how well he carried out the responsibilities assigned to him. In all but the staff specialist population, supervisory responsibility was part of the job specification. Although each man was judged with respect to his contribution to the organization, i.e., job performance, the overall effectiveness of the plant was the sole responsibility of the general manager.

Method. The data were collected by means of a highly structured questionnaire made up of 24 items roughly categorized into four major areas: relations with superior, company policies and practices, peer relationships, and opportunities for self-expression. Stimuli items that were utilized are presented in Table 1. Job condition stimuli were selected on the basis of the literature and discussion with the general manager. They were selected to emphasize only the desirable, nonmaterial aspects of work.

The stimuli were prefaced by the following instructional set:

> The conditions of work listed in this section have been given by managers as things they consider to be important in their work. Obviously, you may not think they are of equal importance. We would like you to tell us how important you think each condition is by using the following alternatives.

Six response categories were provided having a priori weights assigned from 4 through 0 respectively. They were: (4) Essential, (3) Very Important, (2) Quite Important, (1) Of Little Importance, (0) Of No Importance, and (x) Undesirable.[2] The last category was included to provide a meaningful alternative if the a priori selection of items in terms of a desirable continuum was incorrect. Unlike most response alternatives, the meaning intended by the response selection was spelled out in terms of behavioral acts.[3] It was felt that by defining the alternatives in terms of

[1] The categorization was based upon organizational charts, job descriptions, and prolonged discussion with the general manager.

[2] The few individuals who utilized this category were deleted from the analysis.

[3] "Essential" was defined as: "A condition of work which you feel *must* be present in your job. If it were not present, you would try to find another job as soon as possible." "Very Important" was defined as: "A condition of work you feel is *highly desirable*. If your job did not have this characteristic, you would *seriously consider* looking for another job." "Quite Important" was de-

actual behavior, the respondents would tend to give more realistic responses.

Data were analyzed in terms of descriptive statistics, i.e., means and standard deviations, and in terms of intergroup comparisons, i.e., *t* scores and Spearman rho's.

Results. Using a crude criterion of 3.00 or higher, i.e., Very Important to Essential, to designate highly significant areas, it becomes apparent from the study of Table 2, no area scores achieve this level for the top management group. The following items, however, reach or exceed the criterion:

1. Having the opportunity to talk over problems with my superior
2. Knowing whose orders to follow
11. Having knowledge of plant plans that affect me and my job
22. Being consulted before decisions are made concerning me or my department
23. Having sufficient authority for the job expected of me

It should be noted that no highly significant items dealt with relationship with peers.

Like top management, middle management did not have any area scores reaching or exceeding the criterion. Of the four items considered to be highly significant by this management group, all were included by top management as well. Item 23, relating to authority, although ranked fifth in importance by this group (see Table 3), approached but did not reach the criterion. Again, Area 3, relationship with peers, was not represented.

Staff specialists considered four conditions of work to be highly significant. Items 1, 2, and 23 they shared with the two higher managerial levels. But unlike the other two levels, they indicated concern with Item 7 (Knowing where I stand as far as my superior is concerned). It should be noted, however, by referring to Table 3 that both top and middle management ranked Item 7 as being of considerable relative importance, and that staff specialists considered Item 22 high among their ordering of conditions of work. Once again Area 3 was not represented.

First line supervision had many more conditions of work that they

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fined as: "A condition of work that you consider to be *desirable*. If a job did not have this characteristic you *might consider* looking for another job but probably *would not* actually do so." "Of Little Importance" was defined as "A condition of work you would rather have than not have. If your job did not have this characteristic, you might complain, but you would *never consider* looking for another job." "Of No Importance" was defined as: "A condition of work that you feel *makes no difference* to you one way or another." "Undesirable" was defined as: "A condition of work that you *do not* feel should be present in your job."

TABLE 2. MEANS AND STANDARD DEVIATIONS RE IMPORTANCE OF WORK CONDITIONS FOR FOUR LEVELS OF MANAGEMENT

	Top Management		Middle Management		Staff Specialist		First-Line	
Item	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
1.	3.570	.735	3.472	1.014	3.276	.836	3.369	.793
2.	3.570	.505	3.388	.954	3.230	.858	3.500	.903
3.	2.570	1.501	2.694	.909	2.615	1.019	2.804	.948
4.	2.850	.857	2.777	1.072	2.584	.977	3.043	.979
5.	2.850	1.010	2.444	1.166	2.876	1.018	3.086	1.083
6.	2.490	.727	2.417	.982	2.400	.697	2.282	1.058
7.	2.850	.857	2.888	1.051	3.108	.824	3.021	.923
8.	2.710	1.041	2.888	.759	2.984	.834	2.521	1.080
9.	2.420	.535	2.583	.925	2.815	.841	3.021	.969
10.	1.142	1.126	.888	1.265	.615	1.077	1.282	1.263
Area 1	2.818	.316	2.851	.338	2.773	.561	2.958	.915
11.	3.140	.844	3.055	1.093	2.938	.894	2.913	.381
12.	2.710	.716	2.666	1.029	2.830	.940	3.108	.893
13.	1.571	.729	2.027	1.281	2.230	1.029	2.630	.919
14.	2.420	.926	2.861	.948	2.692	.894	3.021	1.034
15.	2.420	.926	2.638	1.034	2.630	.923	2.782	.834
Area 2	2.696	.641	2.507	.521	2.642	.718	2.874	.700
16.	1.850	.849	2.333	1.016	2.307	1.151	2.695	1.102
17.	2.130	.681	2.527	.835	2.338	.829	2.717	.878
18.	2.570	.733	2.833	.899	2.846	.809	2.913	.974
19.	2.420	.756	2.333	.746	2.353	.851	2.500	.995
20.	2.286	.880	2.250	1.010	2.051	.957	2.021	1.033
Area 3	2.479	.562	2.257	.534	2.408	.662	2.601	.904
21.	2.130	.681	2.277	.872	1.661	.982	1.891	.961
22.	3.000	.535	3.000	1.000	2.892	.964	3.086	.884
23.	3.570	.505	2.916	1.141	3.384	.687	3.630	.640
24.	1.850	.659	2.055	1.202	2.030	.978	2.021	1.095
Area 4	2.626	.537	2.643	.377	2.517	.696	2.683	.864

Note. 0 = Of No Importance; 1 = Of Little Importance; 2 = Quite Important; 3 = Very Important; 4 = Essential.

considered to be highly significant than any other group. Items 1, 2, 22, and 23 they shared with top and middle management. In addition, they shared Item 7 with staff specialists. With regard to the following five items, however, they were unique in the importance attributed to them:

4. Having superiors who will help out, but not take over when I get into a jam

5. Working under a superior who judges me solely in terms of my merit

9. Working under a superior who recognizes the problems involved in my work

12. Working in a plant where the responsibilities of every supervisor are clearly defined

14. Working in a plant that is operated efficiently

Turning to items of minimal importance, i.e., item average of 1.00 or less, only two cases occur. Both middle management and staff specialists

Table 3. Ordinal Position of Work Conditions in Terms of Importance for Four Management Levels and Rank-Order Correlations

Item	Summary Content	Rank			
		Top Mgmt.	Middle Mgmt.	Staff Spec.	First-Line
1	Talk with superior	2	1	2	3
2	Know who to follow	2	2	3	2
3	Superior explains changes	11.5	11	14	13
4	Superior helps out	7	10	15	7
5	Judge by merit	7	16	8	5.5
6	Superiors delegate authority	15	17	16	20
7	Knowing how stand	7	6.5	4	9
8	Superior develops subordinate	9.5	6.5	5	18
9	Superior recognizes problems	15	14	11	9
10	Superior will take over	24	24	24	24
11	Knowledge of plant plans	4	3	6	11.5
12	Responsibilities defined	9.5	12	10	4
13	Experience > education	23	23	20	17
14	Efficient plant	15	8	12	9
15	Plant with long range objectives	15	13	13	14
16	Peers recognize importance of my job	18	21	21	21.5
17	Know what others are doing	15	18	17	19
18	Cooperation among peers	11.5	9	9	11.5
19	Peers recognize problems	19.5	15	18	15
20	Peers help out	21.5	18.5	19	16
21	Share in policy making	19.5	20	23	23
22	Consulted on decisions affecting my job	21.5	22	22	21.5
23	Sufficient authority	5	4	7	5.5
24	Can have say in meetings	2	5	1	1

Top Management versus Middle Management	.824 *
Top Management versus Staff Specialists	.758 *
Top Management versus First Line Supervision	.853 *
Middle Management versus Staff Specialists	.899 *
Middle Management versus First Line Supervision	.826 *
Staff Specialists versus First Line Supervision	.799 *

* Significant at .01 level.

consider Item 10 (Working under a man who will take over and do the job for me when I get into a jam) as a relatively insignificant condition of work. It should be noted that although top management and first line supervision exceed the criterion, they do so only by the smallest margins.

Turning to Table 3, from the rank difference correlations one could quite accurately say that the men in the four managerial levels assess the importance of job conditions in much the same manner. But the question remains, even though the profiles of the managerial levels with reference to the 24 conditions of work are very comparable, are the degrees of importance attached to the various elements equivalent across groups? The data in Table 4 provides an answer.

Table 4. Significant Differences between Managerial Levels in Terms of Importance Attributed to Various Conditions of Work as Evidenced by *t* Scores

Item	Levels	*t*
4	First Line > Staff Specialist	2.416 *
5	First Line > Middle Management	2.558 *
8	First Line < Staff Specialist	2.529 *
9	First Line > Middle Management	2.056 *
10	First Line > Staff Specialist	2.964 **
12	First Line > Middle Management	2.065 *
13	First Line > Top Management	2.862 **
13	First Line > Middle Management	2.461 *
13	First Line > Staff Specialist	2.094 *
17	First Line > Staff Specialist	2.297 *
23	First Line > Middle Management	3.552 **
21	Staff Spec. < Middle Management	3.111 **
23	Staff Spec. > Middle Management	2.543 *

* Significant at the .05 level using a two-tailed test.
** Significant at the .01 level using a two-tailed test.

Of the 144 intergroup differences possible, only four, or approximately 2.8% are significant at the .01 level. Thirteen differences, or approximately 9% reach or exceed the .05 level. Considering that statisticians such as McNemar (1949) indicate the desirability of using the more rigorous significance levels when dealing with small sample differences, one could propose that the differences among the managerial levels re importance attributed to various aspects of work could be accounted for largely by chance. One will note, however, that of the 13 differences that reach or exceed the .05 level, 11 of them relate to differences between the first line supervisors and other levels. Again it must be pointed out that utilizing the .01 level only three relationships, or 4.2% of the potential, are significant. In other words, such differences easily could be due to chance factors. Literally, then, there is real doubt as to whether or not true

differences exist among the groups. To the extent that the differences can be considered meaningful, however, the first line supervisors appear to be the deviant group.

Summarizing Table 4, first line supervisors differ from all other groups with regard to the greater importance they attach to Item 13 (Working for a company that stresses experience more than education for promotion). They differ from middle management in that they consider the following conditions to be more important:

5. Working under superiors who judge me solely in terms of merit
9. Working under superiors who recognize the problems involved in my work
12. Working in a plant where the responsibilities of every supervisor are clearly defined
23. Having sufficient authority for the job expected of me

The first line supervisors differ from staff specialists in that they give greater emphasis to Item 4 (Having superiors who will help me out, but not take over, when I get into a jam), Item 10 (Working under a man who will take over and do the job for me when I get into a jam), and Item 17 (Having knowledge of what others are doing in as much as it may affect me and my job). Only with regard to Item 8 (Working under men who attempt to develop their subordinates) do the first line supervisors give significantly less emphasis than staff specialists.

Discussion. What are the implications of these findings? Essentially, the relative importance attributed to various aspects of work are comparable to the findings of other studies, although role in policy formation and the opportunity for upward communication are not stressed as strongly by the management personnel in this study as has been reported in the literature. Basically, these men, regardless of their status within the hierarchy, are oriented rather specifically toward conditions of work that will permit them to function effectively in carrying out their responsibilities. But what characterizes the role obligations of these men that may account for uniformity in this respect? Differences in job specifications, status, and potential for upward mobility have been pointed out. What are the commonalities? The managerial hierarchy like any other social structure has role differentiation; each position serves a function for the organization. But each role holder contributes only a segment of the necessary conditions that will lead to organizational effectiveness whether he be a foreman or a top manager. The efforts of any one man or managerial level cannot insure organizational success.

Of the managers in this study, each was responsible for a segment of behavior that contributed to organizational effectiveness. Each was judged in terms of how well he performed his organizational obligations, not in terms of how well the organization as a whole fared. Unlike the rank-

and-file worker, status maintenance and advancement of these managers was dependent solely upon the performance of their jobs as evaluated by their superiors. Seniority, minimum standards, and job security growing out of a work group orientation such as unionism were not variables in their environment. Predictably, then, the managers would tend to focus upon those conditions that would maximize job effectiveness and consequently the evaluation of their performance in the eyes of their superiors. It seems plausible that commonality existed within the four levels of management studied because the organization made equivalent demands upon them, i.e., they were judged in terms of their job effectiveness. Consequently, only those variables directly related to job success were given maximum weight.

This theorizing does not parallel the writings of Katona (1951) who has suggested an identification of the executive with the goals and welfare of the organization. If Katona's contentions were borne out, one would have expected dominant concern with factors leading to organizational effectiveness, not job effectiveness per se. Although of some importance to this group, such conditions did not dominate their motivational patterns. It is possible that only at the level of plant managers and higher, or perhaps, men who are primarily integrators and policy makers, having a broad perspective and a criterion of personal success based in organizational rather than job effectiveness, that the motivational patterns discussed in this paper would not apply. It is possible that the potentials for motivational differences within the "managerial" class are not fully tested by studying a population such as that tapped in this study. Although a high degree of commonality existed within the levels probed, if corporate level or general level executives had been included within the subject of this study, it is possible that differentiation would have been apparent.

Conclusions

Within the four levels of management studied, there was a high degree of commonality regarding conditions of work considered to be important. In general, the emphasis appeared to relate to those factors in the environment that permitted the manager to perform his job duties effectively. It is proposed that the commonality present occurred in spite of status and role differentiation because, in essence, the managers studied were evaluated in terms of how well they carried out their relatively restricted responsibilities—not in terms of the effectiveness of the overall organization. It was also hypothesized that if differences among management levels were to be discovered, it would occur between management classes responsible for organizational efficiency and other levels, such as those probed in this study, who were responsible only for their jobs.

In a sense, then, perhaps one can accurately talk about "management" as a meaningful, cohesive class sharing common motivations re what they want from their work, if their responsibilities are defined in terms of job rather than organizational effectiveness. Distinctions, with regard to status and occupational role, may only be important if they relate to responsibilities tied to organization rather than job. Among managers with roles primarily defined in terms of job performance, however, differences in responsibilities and status, although apparent, may be psychologically and motivationally unimportant.

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4. Industrial Morale—The Problem of Terminology *

Robert M. Guion

Students in a seminar on morale have been collecting definitions for me. As we go through a few of these, I'm sure you'll recognize an old friend or two:

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1. *Morale is the absence of conflict.* I don't know that anyone has ever seriously proposed this as a fundamental concept, but it is certainly implied in much management action and conversation. It seems rather negative; at best, it reflects behavior usually associated with the ostrich.

2. *Morale is a feeling of happiness.* Again, this is a rather empty sort of definition; a person might be quite euphoric while at work in spite of his job, not because of it. If so, he could hardly be described as one having "high morale." Yet, at his own naïve level, this notion may have some real utility.

3. *Morale is good personal adjustment.* About all that this definition has to offer is a weak attempt to refine the happiness concept as something more than mere euphoria. It would hardly be worth separate mention were it not for the contention that adjustment is an adequate concept for describing individuals, and that therefore the term "morale" may be reserved for groups. I believe that, for the general domain of concepts to which the word has been linked, we need a concept that is more job related than adjustment as such. This does not deny that personal adjustment is a worthy concept!

4. *Morale is ego-involvement in one's job.* This is an intriguing concept; it led me to the opinion, reported in an unfortunate press release as fact, that such things as absence of conflict, happiness, or "good" adjustment might be antithetic to morale. There is something to be said for the attitudinal frame of reference in which a man perceives his job to be so important to himself, to his company, and to society that his superiors' "blunders" are not to be tolerated. Operationally and conceptually, this definition is difficult; it raises many questions. For example, when is a man to be considered ego-involved in his job as opposed to being involved in the job as a symbol of some other involvement: Certainly, this concept is a useful one—for more study.

5. *Morale is the extent of "we-feeling" or cohesiveness of the group.* In part, this definition disturbs me because it seems to ignore the individual; in part, it disturbs me as a gross over-simplification. Certainly it is an exact reversal of the concept of morale as a highly generalized attribute of individuals. It is, of course, extremely meaningful as a basis for useful work.

6. *Morale is a collection of job-related attitudes.* Here morale is defined neither as an attribute of the group nor of the individual, as such. Mainly, it is defined in terms of the environment in which individuals and groups are at work: attitudes toward supervision, attitudes toward product, and the like. This, which those who have made distinctions, believe should be called "job satisfaction," seems to be a surface concept—although not a superficial one, in the sense of being unimportant—and as such may tend to be somewhat unstable.

7. *Morale is the personal acceptance of the goals of the group.* Among

those who have seriously thought about it, this hybrid definition is probably the one most widely accepted. It considers morale an attribute of the individual, but it is an attribute which exists only with reference to the group of which he is a member. It seems to me that the essential implication of such a definition is that morale is a function of the amount of personal need satisfaction the individual can get from the activities and aspirations of a group with which he identifies. I have one quarrel with this concept: I perceive no justification for restricting the term to only those satisfactions which are defined by the group. There are, potentially, at least, other sources of satisfaction—other needs which are predominantly social, but which are at least partly satisfied in the job situation. There are jobs, in which there is no immediate group affiliation; in fact, under this definition, holders of such jobs could not be said to "have" any morale at all, either high or low. To use this concept of morale on such jobs requires the formulation of abstractions of possible group identifications; such abstract groups will be highly subjective.

8. Since I have been finding fault with these definitions, I must present a final definition—one which pleases me, although I hasten to point out that it will not please everyone. *Morale is the extent to which an individual's needs are satisfied and the extent to which the individual perceives that satisfaction as stemming from his total job situation.*

This definition contains five attributes which are, I believe, essential to an adequate concept of morale: (*a*) it recognizes the dynamic complexity of morale. It is the kind of complexity which can use—which, in fact, calls for—the factor analytic approach to definition. It tells us that morale is not a single dimension but that it has many components or factors. It asks only that the factors be defined in terms of human needs, rather than in terms of environmental sources of satisfaction of those needs. (*b*) It considers morale as basically an attribute of the individual. Groups too can be described in terms of morale, but such a description takes as its point of departure the perceived satisfactions of the individuals within the group. It seems to me that the morale of the group is at least partly based upon what I choose to call the morale of the individuals in it. This, I think, is something more than the usual concept of job satisfaction. (*c*) It recognizes that morale exists with reference to the job, not merely as a generalized trait existing in much the same form regardless of the job situation. (*d*) It recognizes the role of the motivational processes in morale. It implies that an individual may have many needs, and that these can be satisfied, either objectively or within the perceptions of the individuals, by the job at which a man makes his living. (*e*) It can apply to employees at any job level or in any job classification: street sweepers or college professors, traveling salesmen or lighthouse keepers, authors, and even industrial psychologists.

5. The Construct Validity of Work-group Morale Measures * [1]

Donald T. Campbell
Bonnie B. Tyler

Brayfield and Crockett (1) have provided a valuable service in their recent review of the literature on employee attitudes and employee performance. Their well-substantiated conclusions as to the general absence of correlation between employee attitudes and such performance measures as productivity, absenteeism, accident rate, and job tenure are so out of keeping with commonly held assumptions that their paper will have a considerable impact upon the utilization of such attitude measures for both research and administrative purposes. In terms of the recent classification of validity concepts (4, 6), their findings point to an absence of both *predictive* and *concurrent* validity for morale surveys, for the typical purposes of their utilization. The present paper raises the question of the construct validity of morale surveys, and presents positive evidence of such validity. Before giving these data, we would like to state briefly our understanding of *construct validity,* in terms somewhat different from Cronbach and Meehl (4), although in fundamental agreement with them.

A given scientific construct has multiple potential operational specifications. If, as sampled, these operational specifications concur, the construct and the sampled measurement techniques have validity. Constructs for which diverse operational specifications persistently fail to agree are in the long run modified or abandoned. In the physical sciences, agreement among methodologically independent operational specifications of the same construct may agree on the order of .99, if expressed as a correlation coefficient over a population of instances. In the psychology of individual and group differences, confirmation coefficients as low as .50 may be comforting, even for something we measure as successfully and as usefully as "intelligence."

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[1] The two studies reported here were conducted in connection with the program of leadership studies of the Personnel Research Board, The Ohio State University, Carroll L. Shartle, Director.

Construct validity thus becomes the correlation among two or more independent measures as conceptually identical in their referents as possible. But the distinction between reliability and validity is still a very important one to retain. Insofar as the measures share the same apparatus or the same approach, they tend to share correlated error variance, or common variance due to features of the apparatus which are irrelevant to the construct in question. These problems are epitomized in the methodological literature under terms such as "apparatus factors" (7), "response sets" (3), and "halo effects" (5), all of which can result in the pseudo-confirmation of constructs. *Reliability* is epitomized by the correlation of two specifications of a construct through maximally similar approaches. *Construct validity* is epitomized by the correlation between two or more specifications of a construct maximally *different* in apparatus or method. The key problem is that of achieving an optimum difference in method, while at the same time retaining maximum identity in constructual referents.

For the studies to be reported, the morale of a work-group may be taken as an average feeling of contentment or satisfaction about the major aspects of the work situation. The typical "morale ballot" or "employee attitude survey" attempts to measure this through anonymous voluntary self-description by the work-group members themselves. As a maximally methodologically independent approach to the same attribute, we have taken measures of the morale reputation of the work-group with the members of other groups, in situations where the work-groups have an opportunity to learn about each other.

The first study (8) was conducted in the home offices of the Farm Bureau Insurance Companies in Columbus, Ohio. The personnel of each of 17 sections were given a 60-item job-opinion questionnaire. At the end of the questionnaire, they were asked "In which sections in your department would you like best to work? Like best——Next best——Third best——." They were tested one section at a time in the cafeteria, with complete anonymity and no supervisory personnel present. Each section was given a rank in terms of its over-all job satisfaction on the 60 items, and a rank in terms of the frequency with which it was mentioned by persons in *other* sections as a place where they would like to work. The rank-order correlation between these two measures was .65.

In the second study[2] (2) a 30-item morale ballot was administered off-ship and under conditions of anonymity to the enlisted men of a squadron of 10 submarines operating out of New London, Connecticut. At the end of the ballot, they were asked to name 3 ships in answer to the question "Which ships in this squadron would you most like to be

[2] This study was supported by the Office of Naval Research, under Contract N6Ori-17T. O. 11 NR 171 123 with the Research Foundation, The Ohio State University.

on for peacetime duty?" The ranking of the ships on the morale ballot total correlated .75 with the ranking of the ships in terms of the number of mentions which they received from other ships.

This method of securing the other work-group reputations along with morale ballot self-descriptions seems to offer a simple check on construct validity which could easily be incorporated into most employee attitude studies. In these two known instances in which it has been applied, it has confirmed the construct validity of work-unit morale with values of .65 and .75. Note the egalitarian nature of this validation procedure. Neither self-description nor reputation has been declared *the* criterion. Both can be recognized as fallible and biased. Yet to the extent that their biases can be assumed to be independent, the two have validated each other and the construct to which they refer.

These results in no wise contradict the findings of Brayfield and Crockett. Construct validity can occur in the absence of predictive and concurrent validity. Indeed, in the first of these studies, Tyler (8) found that the job-satisfaction measure and the reputation measure both showed correlations of .00 with absenteeism, in congruence with the general findings summarized by Brayfield and Crockett. In the submarine study, neither morale measure correlated significantly with re-enlistment rate or Naval records of ship efficiency, although the trend of the correlations was more promising, and the number of cases small.

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Part Two: ATTITUDES AND PERCEPTION

1. The Sensitivity of Employee Attitude Questionnaires * [1]

F. K. Berrien
William H. Angoff

On rare occasions a researcher stumbles upon circumstances in field studies that virtually duplicate laboratory controls. Such a set of fortuitous circumstances provided the authors an unexpected opportunity to gain some clues as to the sensitivity of attitude or morale surveys as conventionally administered to industrial employees.

The sensitivity of attitude questionnaires may be estimated in at least two ways. Method *a* requires that the questionnaire be administered on two occasions to two comparable groups. During the interval between surveys, one of the groups may be subjected to some significant disturbance which would presumably modify attitudes in a particular direction. Sensitivity is estimated from the differences that occur in scores in the "disturbed" group compared with a control group. The method provides no basis for estimating the amount of change to be expected, but does clearly indicate the direction of change.

Method *b* would call for some alternative, independent indication of attitudes such as personal interviews taken simultaneously with at least one administration of the questionnaire. Subsequently, the two sets of results may be compared to see to what degree they correspond. This second procedure has numerous difficulties, such as scaling two unlike estimates and finding adequate common terms of expression.

The following report employs both of these methods, neither of which is wholly satisfactory.

Procedures. In connection with a larger theoretical study of small groups, an attitude questionnaire of 87 items was administered to two

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[1] This study is part of a project supported by Office of Naval Research, Group Psychology Branch, under Contract Nonr-404 (10). John M. Tyler assisted at various stages in the study.

plants of a given company, S and D, separated by several hundred miles. Plant D was essentially a duplicate in goods, operations, machines, and layout to its companion department in Plant S, although the latter had other departments which were independent of the department under investigation. Both plants operated on a three-shift time schedule.

When the first administration of the questionnaire took place in both plants early in 1959, it was announced to the employees that the same questionnaire would be administered at a subsequent date. The second questionnaire was administered to both plants three and one-half months later. During this interval no important changes in procedures, policies, work standards, or personnel occurred in Plant S.

However, one week prior to the second survey in Plant D (disturbed), an announcement was made that operations would be moved a distance of approximately 75 miles to a semi-rural location. Although a move to a nearby location had been rumored among the employees, this announcement came as a surprise. When the local management was questioned as to whether any of the present employees would be invited to move with the Company, an indefinite answer was given. The announced reason for the move was the need for additional space to accommodate expanding operations which could not be obtained in the existing location. However, both the Company and the employees knew that wage rates in the new community would be at a lower level than in its existing location. Consequently, it was fair to assume that if any were invited to be re-employed by the Company in its new location, they could expect reduced wages and additional travel costs. Moreover, even if employees of long seniority obtained employment in the metropolitan area where Plant D was then located, they would suffer in terms of seniority. The announcement therefore posed problems of major adjustments to all employees.

Since the announcement to the employees should affect their attitudes markedly and *in an adverse way,* the situation was well suited to testing the sensitivity of the questionnaires by means of method *a.*

One week after the above announcement was made, questionnaires were administered to "production" employees of the Company in both plants. In an effort to assess the questionnaires by method *b,* informal interviews were conducted in Plant D's lunchroom by the same individual who administered the questionnaires. Respondents were selected at random as they came for lunch or coffee. Since a notice had been posted in advance, advising of the arrival of an independent investigator from Rutgers University, the interviews and the questionnaires were not unexpected.

Employees were interviewed individually or in groups of two or three, sitting around a table. No notes were taken during the interviews, but immediately afterward notes were compiled and dictated in full, recapturing as much as possible the precise words of the respondents. Ap-

proximately 25 per cent of the 78 employees were so interviewed. With only one exception, employees were willing—sometimes eager—to talk to the interviewer.

Results—Interviews. Since the interviews were extremely informal and followed the leads of the employees, the results are presented as salient quotations.

"This change the Company is talking about . . . they don't give us any indication as to whether we'll be given a transfer or not. We don't even know whether we'll be out of a job. . . . Now the foreman here, he doesn't run the outfit because the other men don't respect him. The foreman is up in his fifties. These kids who work in my group haven't really worked anywhere else, but I've been around to a number of places. He doesn't know how to handle these kids. He doesn't really know what it's like anywhere else because he's worked here nearly all his life. In other plants you can kid the foreman a little—but not here! You can't talk to him. You're always wrong. You're never right! Here they pay you for labor, but down the street at the other plant where I worked, they figured that if you were talking you were also making money for the Company."

"I guess I just got to get another job. After you're over forty it's tough. I got two kids, and I used to work in a foundry. But foundries are slow these days. As I figure, they'll move out of here to get cheap labor. They *say* they want more space. I don't know where I'm going to get another job."

"Some semi-skilled people you can get almost anywhere. You can always break them in. But it takes six months for skilled people. They'll get stuck on this move because we won't go with them. I figure they're moving to be close to the source of supplies. My daughter is going to college here next year, so I figure I can't go down there. I'll just have to get another job. I can't say the company is doing right, but we can't do anything about it. Just because we don't like the move wouldn't stop them. Some of the people are counting on severance pay. But the Company could fire them and not pay the severance pay. A lot of people are probably not going to stay around after vacation period. They're going to use that time to look for another job and won't come back here."

"This is the only job the old-timers have had. The Company should try to place some of the old-timers. Gas alone would cost me $16.25 just to go down to X. I'd just be working for gas money, and the pay they'd give you down there wouldn't be worth it! Certainly, that's why they're moving—just to get cheap labor!"

"This is going to come as a jolt to some. I bought a new house and planned my payments out. But I'll have to start all over again at some new job, and I guess I can't keep up the payments."

"When a man is over fifty he has a hard time getting himself relocated. This Company move is a kick in the pants. The Company don't give a damn what happens to the men. The Company knows what they are going to do but

won't say. They want to keep the men in the dark so they won't leave. The morale here is about as low as it can get. There's been more trouble in the plant in the last two weeks than in the last three months."

"I just think they're a bunch of liars! A man stands up and says that the job security depends on the quality of work. And you go out and produce, and then they move the plant sixty—seventy miles. I don't have any job after that for maybe six months or a year. There's no security in that. I don't believe what I read in the newspapers. Now I don't know who to believe!"

"I was counting on my retirement pay. Sure, I get back what I put in, but I don't get the Company's part. That's half of what I counted on. I don't know what's going to happen."

The general impression derived from the interviews was that the people were disturbed, uncertain, resigned to looking for new work, but beginning to become aggressive in their displeasure with respect to the Company's proposed move. Although no employee defended the Company's proposal as good, they recognized that the Company had a right to improve its profit position. They attributed to the Company hidden motives and intentions that were inconsiderate, devious, and unethical.

The questionnaire administration on two occasions was of the Likert-type and included 79 items dealing with relationships with supervisors, freedom of communications, satisfaction with wages, interpersonal relationships, their jobs, and the Company as a whole. Each item provided either four or five alternative answers. On the second administration 11 questions were included asking if they had noticed any changes with respect to the above general areas.

Results—Questionnaires. Respondents were separated into shifts and a mean score was obtained for each item by shifts in both plants for Time 1 and Time 2.

The total number of respondents by shift is given in Table 1. It will be

Table 1. Number of Respondents on Both Surveys by Plant

	Shift A		Shift B		Shift C		Total	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Plant S	30	36	36	37	28	28	94	111
Plant D	19	25	34	31	26	22	79	78

noted that precisely the same persons were not assigned to the same shift on each survey, but the number of transfers or additions during the interval between surveys did not exceed 6 per cent of the total number surveyed. Although the composition of the respondents in each shift was not perfectly controlled, this condition proved not to be a serious handicap in interpreting the data.

Fourteen items having significant mean differences between Time 1

and Time 2 in Plant D follow. The shift in which the differences occurred is given in parenthesis. Compared with the shift's previous responses, employees:

	Diff.
Thought the supervisor was *less* good at trouble-shooting equipment problems. (C)	1.15 ***
Decreased the importance they ascribed to working for a company with a good reputation in the community. (C)	.82 ***
Felt the department was doing a *poorer* job of taking care of breakdowns in equipment. (C)	.78 ***
Felt the supervisor did a *poorer* job of dealing with people. (C)	.73 **
Believed that family and friends outside the company thought *less* well of the company as a place to work. (C)	.68 **
Believed supervisors were *less* interested in employees' welfare. (C)	.68 **
Believed supervisors were *less* considerate of employees' feelings (C).	.60 **
Believed supervisors *did not know* so well the technical aspects of their jobs. (C)	.61 **
Asked advice about job *less* frequently from members of their own work group. (A)	.63 **
Believed supervisor was *less* ready to give credit for good work. (C)	.55 **
Had *less* trust and confidence in supervisors. (C)	.64 **
Felt job standards and time schedules were *more* fair. (C)	.76 *
Felt their jobs gave *less* chance to do the things they were best at. (C)	.84 *
Thought the supervisor was *less* reasonable in what he expected. (C)	.70 *

*** Difference significant at .01 or greater level of confidence
** Difference significant at .01–.05 confidence level
* Difference significant at .05–.10 confidence level

(All tests of significance are uncorrected for the correlation between first and second testing)

Items have been included in the above list having differences up to the 10 per cent level of confidence because the test of significance used was uncorrected for the correlation between scores taken from essentially the same population. Since the populations were not identical but overlapped considerably, a satisfactory correlation could not be computed and employed to correct the conventional *t* test. The confidence levels as given are therefore conservative.

It will be observed that all but one of these item differences occurred on the C shift (4:00 p.m. to midnight). Moreover, eight of these items pertained to the supervisors, and only two referred to the Company as a whole. All but one item showed changes in the expected adverse direction.

Before discussing these changes in greater detail, let us look at the significant item changes in Plant S.

Compared with the shift's previous responses, Plant S employees:

	Diff.
Thought fringe benefits were *less* good. (A)	.57 ***
Thought department was *poorer* in taking care of breakdowns in equipment. (B)	.50 **

	Diff.
Took *less* pride in the business. (C)	.47 **
Found it *easier* to get ideas over to supervisors. (B)	.66 *
Talked over personal problems *less* frequently with members of own group. (C)	.56 *

It is immediately evident that far fewer items have significant differences in Plant S, and these are scattered over all shifts. Furthermore, there appears to be no central theme running through the topics of these items.

It is notable that within the "disturbed" plant (D) the changes refer adversely to the supervisors or Company as a whole, whereas in Plant S the changes are far less focused on the supervisor. In all probability the actual behavior of the supervisors did not change significantly in either plant. One question asked specifically whether employees had noticed any changes in the way the supervisor dealt with people between Time 1 and Time 2. Only 9 per cent in Plant D said they had noticed he was worse (for Plant S, 12 per cent). Consequently we are forced to conclude that the adverse attitudes toward the supervisors in Plant D are the result of a change in employee perception rather than an actual change in behavior.

This is the major area in which item changes occurred in Plant D; yet, this is curious since the disturbance was initiated by the general management, and the immediate supervisors were as much inconvenienced by the proposed move as the direct workers. The scapegoating of the supervisors extended beyond interpersonal relations to perceptions of lowered technical skill, less interest in employee welfare, less reasonableness in expectations. This certainly suggests strongly that even though the source of disturbance was clearly known to the employees, the questionnaire results are understandable only by invoking a well-known defense mechanism. If the source of the disturbance had not been known, but only the questionnaire results, we might have concluded that the supervisors had declined in supervisory skills. In many other situations, where less is known about a group of workers, such a conclusion might be drawn. These results therefore indicate that the interpretation of a morale survey can be a fairly complicated task requiring more than statistical sophistication.

In summary: The questionnaire showed 14 significant item changes in the disturbed plant against five in the control plant. All but one of the significant items in the disturbed plant are in the expected direction. One might therefore conclude that the questionnaire is reasonably sensitive.

On the other hand, the questionnaire contained 79 items on which the employees could have expressed a difference of attitude—yet only 14, or 18 per cent, showed differences large enough to be reasonably attributed to the "disturbance." Furthermore, the changes in attitude were largely

registered by only one of the Plant D shifts. Why other shifts, equally affected by the move, showed no significant changes is far from clear.

Therefore, it is evident that a large part of this questionnaire was insensitive to a disturbance of major proportions. Furthermore, the significant attitude changes centered around items pertaining to supervision in which there was apparently no actual change. In addition, there were seven items referring to the Company as a whole and its management. In Plant D only two of these items showed significant changes. Although these findings may be unique to this instance and this questionnaire, the type of questions and format were typical of many currently in use either as research instruments or as administrative personnel tools. If one accepts these findings as in any way representative of those generally obtained in industrial settings, some reservations should be entertained concerning the sensitivity and interpretation of such measures, especially when the working conditions change less drastically than those described herein.

Comparison of Interview and Questionnaire Results. Because no interviews were conducted of any employees in either plant when the first questionnaire administration took place, it is necessary to confine the comparison of interview and questionnaire results to Plant D and only at Time 2.

First, it is notable that during interviews, workers criticized the Company freely and the supervisors rarely. On questionnaires, the reverse was true. Explanation of this discrepancy is difficult. In talking to an outsider, is it *safer* to criticize the Company, whose home office is several hundred miles away, than to complain about one's immediate boss? Or, in the anonymity of a questionnaire, are people more frank about the boss? Or does the supervisor become the innocent victim of complaints whose source lies above him? Here it appears that the interview comments were more relevant to the facts of the situation than the quantitative changes, but why this was so is not clear.

Since no effort was made by the interviewer to steer the conversation into areas covered by the questionnaire, a large part of the comments were about the motives for the move, the consequence to the workers, the uncertainty about future employment, and the unwillingness to pull up roots in an urban area for life in a rural or semi-rural setting. One can only roughly estimate the intensity of feelings from the remarks. On the basis of these rough data, however, the interviewer was surprised to discover that the questionnaire changes were as small as reported above. He expected more item changes and changes of greater magnitude. Only one item had a mean change greater than a single step interval in a 5-step scale.

The causes for the discrepancy between the subjective estimate of the decline in morale and the objective scoring of the questionnaire are unclear. One source of error may reside in the absence of uniform scaling

within the questionnaire. An increment of .5 on one item may not be equivalent to an equal increment on other items. Therefore, it may be that the items which changed in Plant D by an amount equal to other item changes in Plant S represented actually greater psychological changes than the raw scores suggest. The Thurstone technique of scaling attitude items might have been helpful in this connection, but it should be noted that few employee attitude questionnaires are based on this refinement, for the reason that (as Likert discovered) such refinements contribute little to actual precision.

A second source of error may be found in the misunderstanding of the language and the absence of local lingo in the questionnaire, which might have maintained rapport and promoted confidence. Again, attitude questionnaires, that are to be used in a variety of settings to get comparisons of the sort described herein, cannot be edited for each group without also running the risk of changing the meanings of questions.

A third source of error may be the misperceptions of the interviewer in estimating the morale level. This may be reduced by additional interviewers, but the multiplicity of observers alone will not necessarily reduce constant errors of bias and may only reduce the variable errors.

No clear conclusion can be drawn from the interview data concerning the sensitivity of the questionnaire except in the most gross terms. Both procedures indicated the development of adverse attitudes toward the Company, but the interviews suggested greater disturbance than the questionnaires.

Perhaps, instead of treating the interview material as an independent measure of attitudes, it is wiser merely to consider it as supplemental material indicating, in ways which the questionnaire could not, the wide areas of disturbance. The informality of the interviews was an advantage in gaining wider coverage of the most salient attitudes, but it was a disadvantage in getting data that could be directly related to questionnaire results.

If this view is adopted, then the major issue to be resolved is the focus of criticism; is it the Company or the immediate supervisor? The most satisfactory interpretation is that the interviews correctly identified top management as the source of employee disturbance, while the questionnaire provided many opportunities which respondents seized to vent displaced aggressions against the supervisors, even though the respondents knew the supervisors were not responsible for the pending loss of jobs. This suggests that the questionnaire method alone of estimating employee morale is less satisfactory than a combination of interviews and questionnaires.

Conclusions

The questionnaire appeared deficient in sensitivity since only a few items showed statistically significant changes in only one portion of the

"disturbed" plant. Moreover, the changes in item scores were small compared to those that were possible and expected.

Because the interviews were unstructured, the resulting information could not be directly compared with the questionnaire data. Subjective estimates of the decline in morale were greater than revealed in the questionnaire, but both were in the same direction. Interview responses correctly identified the source of disturbance as the general management, but the chief adverse changes in the questionnaire centered on the supervisors.

Instead of employing questionnaire data as the sole indicator of attitudes, it is suggested that interviews be considered as supplemental materials giving some context and additional meanings to the questionnaire scores.

2. Company Policies and Supervisors' Attitudes toward Supervision * [1]

Erwin S. Stanton

This investigation was designed to study the relation between company policies and supervisors' attitudes toward supervision in two companies, one of which was characterized as having democratic management, the other, an authoritarian management.

Research Design. *Selection of the Two Companies.* Two industrial organizations were selected for detailed investigation because from a preliminary study of anecdotal data, firsthand observations, and a tentative analysis of personnel policies, it appeared that these two companies differed substantially in their approach to management. Both companies are leaders in their respective industries and maintain their executive and administrative offices in a large metropolitan city along the eastern seaboard. The democratic company is a medium-sized organization engaged in the metal fabricating industry and operates a number of manufacturing plants in various parts of the country. Its executive office, comprising approximately 70 employees, is primarily concerned with administrative

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and managerial functions. The authoritarian company is one of the nation's largest operating and holding companies with varied and diversified interests throughout the United States as well as in several foreign countries. Approximately 2,000 persons are employed in the company's corporate office and are engaged in carrying out duties similar to those performed in the democratic company.

Personnel Policies in the Two Companies. In each of the two companies, personnel policies currently in practice were subjected to a detailed content analysis. This was done by studying written statements, administrative decisions, manuals, annual reports, and letters to employees and stockholders as well as stated goals and objectives. In addition to investigating personnel policies appearing in company literature, management officials in both organizations were interviewed using an unstructured interview. All data gathered in this fashion were classified into numerous categories. This was then followed by an investigation of what appeared to be significant differences as well as similarities between the two companies. Although there were fundamental differences in personnel policies between the two companies, there were also numerous basic similarities. Of primary significance was the finding that in *both* companies consideration for the employee was accorded major importance. In both the democratic and the authoritarian companies management officials were most emphatic in stressing the importance of treating their employees with maximum consideration. In addition, both organizations provided favorable working conditions, attractive salaries and advantageous benefits for their employees.

Differences between the Two Companies. Besides similarities found in both companies, the content analyses of policies of the two organizations disclosed substantial differences which are grouped under six factors, as given on page 63.

Raters' Evaluation of Personnel Policies in the Two Organizations. Because of the unavailability of an established scale of democratic-authoritarian management, it was necessary for the investigator to construct his own scale based on a content analysis of personnel policies in each of the two companies. This introduced a regrettable, but unavoidable, element of subjectivity. To some extent, however, it was felt that this subjectivity could be significantly reduced if the data obtained from the content analyses of the two companies' policies could be evaluated by a group of impartial raters. Accordingly, the data that appeared to differentiate the two companies were summarized into 60 matching statements, half describing the democratic company and the other half referring to the authoritarian company. The statements were then categorized into the six factors previously defined and presented in an analytical and nonidentifying manner to five raters, each of whom was actively engaged in the field of personnel psychology. Without knowing to which company any given

item referred, the raters were asked to evaluate the data presented using a 7-point rating scale along a democratic-authoritarian continuum. Average ratings for the 60 statements were then computed and tested for significance. The difference in mean scores between the two companies was

DIFFERENCES BETWEEN THE TWO COMPANIES

Factor	Democratic Concept	Authoritarian Concept
(1) Philosophy of Management	An industrial organization must show a profitable operation, but it also has a broad obligation to its employees and to the public.	The function of a commercial enterprise is basically to show a profitable operation. All other considerations are secondary.
(2) Concept of Supervision	A supervisor should give leadership and guidance to his employees and build an efficient and satisfied cooperative work team. This is accomplished by working with and through his subordinates.	A supervisor should develop his employees to the extent that they understand exactly what is expected of them, so that they will be able to perform their work efficiently. Emphasis is placed on the supervisor's own personal qualifications as evidence of leadership ability.
(3) Joint Participation	Employees participate with management in defining the goals and policies of the company as well as take part in the planning of the work of their own departments.	All policy formulation is decided upon by management without employee participation. Work assignments are planned by department heads and then distributed to each employee.
(4) Releasing of Information	Employees are entitled to a great deal of information about the company and its activities. In order to foster the spirit of cooperation, the better informed the employees are, the better they can contribute to the progress of the company.	Information should be restricted to a select group of management officials. Employees need to know only enough information as is required for the successful performance of their duties.
(5) Recognition of the Individuality of the Employee	The employee's individuality is recognized and respected. Persons are not alike in all ways and the law of individual differences is applied in dealings with employees.	Persons are regarded as essentially alike and consequently must be treated in a uniform manner according to established rules and regulations determined by management.
(6) Rigidity-Flexibility	A general flexibility is prevalent. Employee rules, regulations, and policies are more flexibly interpreted, taking individual circumstances into account.	A general lack of flexibility is prevalent. Employee rules, regulations, and policies are rigidly stated, and deviations occur rarely and only under very unusual circumstances.

found to be significant far beyond the .01 level. Apparently the raters agreed with the investigator that, based on the statements presented to them as a result of the content analyses, the two companies did differ.

Measuring Instruments. The two instruments used in this investigation were the *Supervisory Practices Inventory,* Form D (Nelson, 1955) and the *Leadership Opinion Questionnaire* (Fleishman, 1957). The first instrument is an untimed, 50-item, multiple-choice inventory of internalized attitudes toward supervision (Nelson, 1949). This inventory yields a "human relations index" which appears to be somewhat comparable to the Consideration Scale of the *Leadership Opinion Questionnaire,* discussed below. This dimension is referred to in this study as "consideration."

The Leadership Opinion Questionnaire is an untimed, 40-item, multiple-choice questionnaire describing how a person thinks he should operate in a leadership situation. The questionnaire has been factor-analyzed to yield two independent leadership dimensions: "Consideration" and "Initiating Structure." These dimensions have been described as follows:

> Consideration—Items with high positive loadings on this factor were associated with behavior indicative of friendship, mutual trust, respect, and a certain warmth between the leader and his group. High negative loadings appeared on items which suggest that the leader is arbitrary and impersonal in his relations with group members.
>
> Initiating Structure—Items with high positive loadings on this factor imply that the leader organizes and defines the relationship between himself and the members of his group. He tends to define the role which he expects each member to assume, and endeavors to establish well-defined patterns of organization, channels of communication, and ways of getting the job done (Fleishman, Harris, & Burtt, 1955).

In addition to these two instruments, each S completed an autobiographical questionnaire which solicited such data as age, education, years of employment with the company, years of supervisory experience with other companies and the number of employees supervised.

Subjects. A total of 86 Ss participated in this investigation, 28 being from the democratic company and 58 from the authoritarian organization. All of Ss were office supervisors of clerical and administrative personnel and were responsible primarily for women clerical employees. Personal characteristics of Ss were analyzed, and the only significant difference found between supervisors in the two companies was that those from the authoritarian company were responsible for a much larger group of employees than were supervisors from the democratic company.[2]

[2] Further analysis indicated that in neither company was there a significant relation between the number of employees supervised and supervisors' attitudes toward supervision. Differences in the two companies could apparently not be explained as a function of the size of group supervised.

Results. *Company Policies and Supervisors' Attitudes on Consideration toward Employees.* As Table 1 indicates, on neither of the two tests measuring a supervisor's attitude on showing consideration toward his employees was there a significant difference between the democratic and authoritarian companies. Even though the two organizations showed significant differences along the democratic-authoritarian management continuum, their mean scores on the Consideration Scale of the *Leadership Opinion Questionnaire* and on the human relations index of the *Supervisory Practices Inventory* did not differ significantly.[3] There also appeared to be no significant difference between the standard deviations of the two organizations. The data suggest that the attitude of supervisors in companies characterized by authoritarian policies need not necessarily be less considerate of the feelings and desires of their employees than the attitude of supervisors in democratic companies.

TABLE 1. SUPERVISORS' ATTITUDES ON CONSIDERATION TOWARD EMPLOYEE

Instrument	Democratic Company			Authoritarian Company			Critical Ratio
	Mean	*SD*	Range	Mean	*SD*	Range	
Leadership Opinion Questionnaire Consideration Scale	54.5	6.8	42–65	52.6	8.1	36–70	1.13
Supervisory Practices Inventory	29.4	4.2	23–36	27.8	5.6	16–44	1.47

It was further interesting to note that in the authoritarian company a positive relation was found between length of service and supervisors' attitudes concerning showing consideration toward their employees. This was indicated by correlations of .41 (significant at the .01 level) and .26 (significant at the .05 level) on the Consideration Scale of the *Leadership Opinion Questionnaire* and the *Supervisory Practices Inventory,* respectively. One possible explanation for this finding is that supervisors in the authoritarian company adopt with the passing of time a

[3] An analysis of mean scores of supervisors in both companies on the Consideration Scale of the *Leadership Opinion Questionnaire* indicated that the scores were not significantly different from normative data reported by Fleishman, 1957. No normative data is as yet available for Form D of the *Supervisory Practices Inventory.*

more benevolent and paternal attitude toward their subordinates. On the other hand, it is also possible that differences in selection standards may account for these results. Perhaps selection standards used in employing supervisors many years ago were different from those more recently in practice. It is further possible that still other factors yet to be investigated may have been operating and that these could explain the relation between longevity and supervisors' attitudes on showing consideration toward employees. In the democratic company no significant correlation was found in this particular area. It would appear that longitudinal studies need to be carried out before definitive conclusions can be drawn.

Company Policies and Supervisors' Attitudes on Imposing Operating Structure. Table 2 illustrates that there was a significant difference be-

Table 2. Supervisors' Attitudes on Imposing Operating Structure

Instrument	Democratic Company			Authoritarian Company			Critical Ratio
	Mean	*SD*	Range	Mean	*SD*	Range	
Leadership Opinion Questionnaire Initiating Structure Scale	50.1	5.5	42–61	56.4	7.0	38–69	4.50 *

* Significant at the .01 level.

tween supervisors in the two companies on the Initiating Structure Scale of the *Leadership Opinion Questionnaire.* Apparently, supervisors in the authoritarian company felt that they themselves should clearly define and facilitate group interaction toward goal fulfillment and provide for comparatively little employee participation in decision making. These supervisors believed that it was primarily their responsibility to initiate leadership functions. Supervisors in the democratic company, on the other hand, believed in imposing far less operating structure in their dealings with employees and favored allowing them greater participation. There was no difference between the standard deviations on this scale for the two companies investigated.[4]

[4] A comparison of mean scores obtained by supervisors in the two companies on the Initiating Structure Scale of the *Leadership Opinion Questionnaire* with normative data published would suggest that both organizations represented opposite extremes on this leadership dimension. The mean score on this scale for the democratic organization was significantly lower and the mean score for the authoritarian company was significantly higher than normative mean scores reported by Fleishman, 1957.

Discussion and Conclusions

Research investigators differ greatly in their conclusion as to the type of management that should prevail in an industrial organization. Certain investigators have for some time reported on the advantages of the democratic approach to leadership (Bavelas & Lewin, 1942; Bradford & Lippitt, 1945; Gordon, 1955; Viteles, 1953). On the other hand, writers critical of democratic management have recently expressed a preference for a return to a more authoritarian type of leadership (McMurry, 1958; Tannenbaum & Schmidt, 1957). According to supporters of democratic management, where employees are permitted to participate in decision making, morale and productivity correspondingly increase and many of the psychological needs of the individual tend to be satisfied. Critics of democratic management, however, point out that the majority of employees are neither able nor interested in engaging in participative management and suggest that democratic leadership may even impede industrial effectiveness. These two opposing points of view have presented somewhat of a dilemma not only to research investigators, but also to management officials who pose the question: "Under what type of leadership—democratic, authoritarian or perhaps a compromise between the two—can the organization operate most effectively and meet its objectives?"

Implications of This Investigation. This investigation was concerned with studying the relation between policies of a democratic and an authoritarian company and supervisors' attitudes toward supervision. It was found that in *both* companies there was no significant difference in supervisors' attitudes as to the extent of consideration that should be shown for the feelings and desires of employees. There was, however, a very significant difference in the attitude of supervisors as to the type of operating structure that they felt should be established in their dealings with employees. Supervisors in the democratic company believed that they should offer less operating structure and favored permitting employees a greater amount of control over their jobs. In the authoritarian company, on the other hand, supervisors believed in establishing a high degree of operating structure in their dealings with employees and allowing them comparatively little control over their jobs (Stanton, 1959).

The data supplied by this investigation suggest that a company can offer an authoritarian approach to leadership and still show consideration for the individual employee. Unlike the negative implication suggested by the treatment of the individual under a totalitarian national state, this study failed to support the assumption on the part of some persons that an authoritarian approach in an industrial situation must, of necessity, be accompanied by a lack of consideration for the fundamental rights of the individual employee. Should further studies confirm these findings, it is

quite possible that many of the negative connotations implied by the term "authoritarian" are unjustified when applied to industry. The results of this investigation would suggest that an organization may select a democratic, authoritarian, or a compromise approach to management and still be considerate of the feelings and desires of its employees.

The type of approach that a company's management may find most effective for its particular organization appears to be closely related to situational factors. It may very well be that, under certain circumstances, a democratic approach to management may be more effective, while in another situation, an authoritarian approach is preferable. Quite possibly, in a military situation, in a crisis, or when an emergency arises, firm, authoritarian, and directive leadership may not only be the most effective type of leadership, but also the style that is most welcome to all concerned. Another situational factor that must be considered in selecting a management approach is the particular leadership style preferred by the employees and the pattern to which they have become accustomed. It is suggested that a more democratic approach can be instituted only where employees are interested in and ready to assume responsibility for participation, identify with the goals and objectives of the organization, and have sufficient experience and knowledge to deal with the problems at hand. Where these qualifications are lacking or appear in limited degree, a more authoritarian or compromise approach may very well be most effective.

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3. Leader Authoritarianism and Employee Attitudes *

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Summary. The relationship between the authoritarianism of supervisors (as measured by the *F*-Scale) and the attitudes of their subordinates has been studied in two different operations within a single industrial organization. Significantly different results were obtained in these two situations. Employees in small work groups which were characterized by a great deal of interaction among workers, and between workers and their supervisor, and by a high degree of interdependence had more positive attitudes toward equalitarian leaders. On the other hand, employees in large work groups, in which opportunities for interaction among workers, and between workers and their supervisor, were greatly restricted and in which individual employees were highly independent, were found to have more positive attitudes toward authoritarian leadership.

The findings support a situational approach to leadership and suggest that the effectiveness of democratic leadership depends greatly upon the interdependence of the work group and restraints on interaction between supervisor and subordinates. They also raise serious doubts concerning the extent to which leader behaviors can be inferred from the perceptions of their subordinates.

Introduction. Psychologists have long been interested in problems of leadership. Early research conducted in this area was based on a "great man" theory and was directed toward identifying the traits and behaviors associated with effective leadership. Most present day discussions of the subject, however, stress its situational nature. Leadership is evaluated in terms of a number of aspects of the social situation. A trait or behavior

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which is effective in dealing with one situation may be completely ineffective in dealing with a different situation.

The decision-making process represents one aspect of leadership which has received considerable attention. The concepts of autocratic, democratic and laissez-faire leaders introduced by Lewin, Lippitt and White (1939), and subsequent concepts of group decision (Maier, 1952), locus of organizational control (Morse & Reimer, 1956) and participation in decision-making (French, Israel & Ås, 1960; Vroom, 1959b) refer directly or indirectly to leader behaviors which determine the amount of influence which various persons have in decision-making. The general pattern of results indicates that subordinates who are involved in the decision-making process have more positive attitudes (Jacobsen, 1951), have fewer absences (Mann & Baumgartel, 1952), lower turnover (Ross & Zander, 1957; Wickert, 1951) and are more productive (Coch & French, 1948; Morse & Reimer, 1956).

Other studies (Bass, *et al.*, 1953; Hollander, 1954; Masling, *et al.*, 1955; Rohde, 1951) have been concerned with the personality characteristics of leaders which may affect the extent to which they involve others in decision-making. Authoritarians (persons getting high scores on the *F*-Scale) have been found to be less frequently chosen as leaders or as friends than equalitarians (persons getting low scores on the *F*-Scale).

In keeping with the situational approach to leadership, recent studies (French, *et al.*, 1960; Tannenbaum & Allport, 1956; Vroom, 1959b) have been concerned with the conditions under which participative approaches to leadership are effective. The results suggest that the effects of the degree to which leaders involve their subordinates in decision-making vary greatly with the personality characteristics of subordinates and subordinates' feelings about the legitimacy of participation in that situation.

The purpose of the present study is to explore the relationship between the authoritarianism of supervisors in a large delivery company and the attitudes of their subordinates. Data from two sets of work groups differing greatly in degree of interdependence, amount of contact with supervisor, and size will be used to gain some insights into the extent to which the effects of leader authoritarianism vary with these situational characteristics.

Research Site. This study was carried out in a single plant of a large delivery company in April, 1957. The plant was composed of 28 geographically-separated operating stations, each employing about 50 persons. There were two distinct work units in each station: (1) drivers and (2) positioners.

(1) *Drivers*

Drivers report to work at 8:30 A.M. and are assigned their trucks and routes and given any special instructions for the day. By 9:00 all drivers have left with their day's load. Each drives a relatively fixed route to deliver his par-

cels. When he returns to the station in the afternoon, he turns in his C.O.D. money, returns parcels, tells his supervisor about any special problems and then leaves for the day.

There are 30–50 drivers assigned to each station, each of whom reports directly to the station manager. One driver is assigned to each truck and he is paid on an individual piece rate basis. The nature of the work restricts interaction among drivers and between drivers and their station manager to a few minutes at the beginning and end of each day.

(2) *Positioners*

Positioners are responsible for taking the parcels from a continuous conveyor belt and positioning them on shelves corresponding to an appropriate truck route. There are 8–10 men in a crew. They work on both sides of the conveyor belt to position packages for about 30–50 routes. The positioning of packages takes about 3 to 4 hours after which the positioners make up a list of all the packages for each driver and then load the packages on the trucks. When everyone is through loading his trucks, the positioners are done. The team arrives to work about 11:30 P.M. and leaves around 8:30 A.M. to 9:00 A.M. Unlike the drivers, positioners are paid on a group incentive plan based on a standard rate for the number of pieces per hour. There is a great deal of interaction among positioners and between positioners and their night supervisor who works along side of them throughout the entire operation.

Since there were great differences between the work group organization of drivers and positioners, the data were analyzed separately for these two sets of groups.

Measures. The authoritarianism of station managers (to whom drivers reported) and night supervisors (to whom positioners reported) was measured by responses to 25 items from forms 40 and 45 of the *F*-Scale [2] developed by Adorno, *et al.* (1950).

The attitudes and perceptions of drivers and positioners were measured by means of an attitude questionnaire consisting of questions with fixed alternative answers. Responses of all drivers or positioners to a single item were averaged and combined with the responses of the same group to one or more other items. The measures used and their component items [3] are described below:

(1) *Attitude toward over-all work situation*

Taking all things into consideration, how do you feel about your future with (name of company)? (5 alternatives: very secure to not secure at all)

Taking all things into consideration, how satisfied are you with your job and the company? (5 alternatives: very well satisfied to not at all satisfied)

(2) *Attitude toward supervisor*

How free do you feel to discuss your personal problems with your (*station*

[2] *F*-Scale scores were obtained for 28 station managers and 24 night supervisors.

[3] The items were combined into measures both on the basis of logical relationship to the underlying construct and empirical relationship to one other.

manager or night supervisor)? (5 alternatives: always feel free to never feel free)

How often does your (*station manager or night supervisor*) express appreciation for your work? (5 alternatives: very often to never)

From your dealings with your (*station manager or night supervisor*) how well would you say the following comment fits him? Considerate of our feelings. (4 alternatives: fits him very well to doesn't fit him at all well)

How well do you think your (*station manager or night supervisor*) understands the employee's viewpoint? (5 alternatives: a complete understanding to no understanding)

How good is your (*station manager or night supervisor*) in dealing with people? (5 alternatives: an excellent job to a poor job)

(*3*) *Attitude toward work group*

Comparing the people you work with and people in other stations doing the same kind of work, how does your group compare in getting the job done? (5 alternatives: among the very best to among the poorest)

To what extent do people in the different jobs in your station see eye-to-eye on things about the everyday operations of your station? (5 alternatives: complete agreement to no agreement)

(*4*) *Attitude toward pay*

How satisfied are you with your present wages? (5 alternatives: completely satisfied to not at all satisfied)

How do you feel about the standard or time schedules set up for your job? (5 alternatives: very fair to not at all fair)

(*5*) *Attitude toward higher management*

How well do you think your division manager understands the employee's viewpoint? (5 alternatives: a complete understanding to no understanding)

How good is your division manager in dealing with people? (5 alternatives: an excellent job to a poor job)

(*6*) *Perception of supervisor's participativeness*

Does your (*station manager or night supervisor*) ask your opinion when a problem comes up that involves your work? (5 alternatives: always to never)

If you have a suggestion for improving the job in some way, how easy is it for you to get your ideas across to your (*station manager or night supervisor*)? (5 alternatives: very difficult to very easy)

Do you feel that you can influence the decisions of your (*station manager or night supervisor*) regarding things about which you are concerned? (5 alternatives: to a very great extent to not at all)

(*7*) *Perception of tension with supervisor*

On the whole, would you say that in your station there is any tension or conflict between employees and the (*station manager or night supervisor*)? (5 alternatives: a great deal of tension to no tension at all)

(*8*) *Perception of tension between supervisor and higher management*

On the whole would you say that in your station there is any conflict between the (*station manager or night supervisor*) and his own supervisor? (5 alternatives: a great deal of tension to no tension at all)

(*9*) *Perception of pressure for high performance*

On the job, do you feel any pressure for better performance over and above what you think is reasonable? (5 alternatives: a great deal of pressure to very little pressure)

From your dealings with your (*station manager or night supervisor*) how well would you say the following comments fit him?

a. Reasonable in what he expects. (4 alternatives: fits him very well to doesn't fit him at all well)

b. Too strict. (4 alternatives: fits him very well to doesn't fit him at all well)

(*10*) *Perception of supervisor's influence*

From your dealings with your (*station manager or night supervisor*) how well would you say the following comment fits him? Lets his boss decide things. (4 alternatives: fits him very well to doesn't fit him at all well)

How much influence do you feel your (*station manager or night supervisor*) has on what goes on in your station? (5 alternatives: a very great deal of influence to little or no influence)

(*11*) *Estimate of frequency of group meetings with supervisor*

Except for regular inspection meetings, how frequently does your (*station manager or night supervisor*) hold group meetings with you and other men doing the kind of work you do? (7 alternatives: never to once a day)

(*12*) *Estimate of frequency of individual contact with supervisor*

How often does your (*station manager or night supervisor*) discuss various aspects of your work with you individually? (7 alternatives: never to a couple of times a week)

The effects of leader authoritarianism on the attitudes and perceptions of employees were determined by intercorrelating, for each set of groups, the authoritarianism score of supervisors with the mean score of their subordinates on each of the attitude and perception measures. Stations managers' authoritarianism scores were related to the attitudes of their positioners. Pearson product moment correlation coefficients were used throughout the analyses to determine relationships between variables. Two-tailed tests have been employed to assess the statistical significance of single correlation coefficients and of differences between correlation coefficients.

Results and Discussion. The first analysis explored the relationship between leader authoritarianism and subordinate attitudes. Most studies of leadership (Halpin & Winer, 1952; Kahn & Katz, 1953, pp. 612–628; Morse, 1953; Vroom, 1959b) have shown relatively high satisfaction and morale in groups with democratic leadership and relatively low satisfaction and morale in groups with more autocratic or authoritarian leadership. If it is assumed that authoritarian leaders, as measured by *F*-Scale, are less inclined to involve their subordinates in decision-making and less considerate of personal feelings and needs of their subordinates, one would expect to find a negative relationship between authoritarianism and attitudes. Subordinates of equalitarian supervisors would be expected

to be most satisfied and those of authoritarian supervisors least satisfied.

Table 1 shows the correlations between supervisor's authoritarianism and various work-related attitudes of drivers and positioners. The findings for the positioners are generally consistent with our predictions. Negative correlations were obtained between the *F*-Scale scores of night supervisors and positioners' attitudes toward their supervisor ($P < .05$), and over-all work situation ($P < .10$). The findings for the drivers, on the other hand, are directly contrary to those for positioners. Positive correlations were obtained between station manager authoritarianism and all five measures of driver attitudes, with three of the five relationships being significant at the .05 level. Apparently, drivers prefer more authoritarian leaders, while positioners tend to prefer equalitarians. The differences between two of the five pairs of correlations are significant at the .01 level while two others approach significance ($P < .10$).

Table 1. Relationship between Supervisor's Authoritarianism and Attitudes of Drivers and Positioners

Attitudes toward	Drivers ($N = 28$ groups)	Positioners ($N = 24$ groups)	t_{Diff}
Over-all Work Situation	.42 **	—.37 *	2.83 ***
Supervisor	.41 **	—.41 **	2.95 ***
Work Group	.47 **	.01	1.69 *
Payment	.29	—.19	1.68 *
Higher Management	.22	—.23	1.55

Note: High scores on the attitudinal variables indicate positive attitudes.
*** $P < .01$
** $P < .05$
* $P < .10$

Since the present study used authoritarianism, a personality variable, while previous research has focused on the effects of autocratic and democratic leader behaviors, it becomes important to determine the behavioral correlates of the authoritarian-equalitarian leadership dimensions. Do persons who subscribe to *F*-Scale attitudes typically display authoritarian behavior? While there is a body of evidence supporting the assumption of behavioral differences between authoritarians and equalitarians (Bass, *et al.*, 1953; Rohde, 1951; Scodel & Mussen, 1953) as measured by the *F*-Scale, this evidence falls far short of establishing a unity between authoritarian attitudes and authoritarian behavior.

In an attempt to determine the behavior differences between authoritarian and equalitarian leaders in the two operations, leader authoritarianism scores were correlated with various measures of their subordinates' perceptions of leader behavior. The results of this analysis, presented in

Table 2, show significantly different relationships between drivers and positioners on four out of seven sets of variables. Authoritarian station managers are perceived to be more participative, exerting less pressure on subordinates, and creating less tension both with their own supervisors and with their subordinates. On the other hand, authoritarian night supervisors are perceived to behave in an exactly opposite manner. They are seen as less participative, exerting more pressure, and creating more tension both with supervisors and subordinates.

Table 2. Relationship between Supervisor's Authoritarianism and Drivers' and Positioners' Perceptions of the Supervisor's relations with Others

	Drivers ($N = 28$ groups)	Positioners ($N = 24$ groups)	t_{Diff}
Perception of Supervisor's Participativeness	.36 *	−.58 **	3.51 ***
Perception of Pressure from Supervisor ...	−.38 *	.40 **	2.78 ***
Perception of Tension with Supervisor ...	−.40 **	.33	2.59 **
Perception of Tension between Supervisor and Higher Management	−.38 *	.19	2.00 **
Perception of Supervisor's Influence	.23	.12	ns
Estimate of Frequency of Group Meetings .	−.14	−.03	ns
Estimate of Frequency of Individual Contact	−.07	−.19	ns

*** $P < .01$
** $P < .05$
* $P < .10$
ns = not significant

If the perceptions of drivers and positioners are assumed to be veridical, it follows that authoritarian leaders behave in very different ways in the two situations. However, this is not a necessary conclusion. There is a great deal of evidence to show that complex perceptions, such as those measured in this study, are influenced by a number of distorting factors including the attitudes and needs of the perceiver. The present data can be interpreted in terms of the well-recognized tendency of persons to attribute "favorable" characteristics to objects toward which they have a favorable attitude, i.e., the halo effect. Supervisors who are well-liked by their subordinates are seen as being participative, exerting less pressure, creating less tension, etc. The differences in the perception of authoritarians in the two situations may be explained in terms of the differences in attitudes on the part of their subordinates rather than to real behavior differences. This interpretation is strengthened by the fact that those perceptions which are relatively nonevaluative (estimate of frequency of group meetings, estimate of frequency of individual contact, and perception of supervisor's influence) show very similar relationships to authoritarianism in the two situations.

This analysis of the relationships between leader authoritarianism and subordinate perceptions has not answered our questions concerning the behavioral correlates of *F*-Scale attitudes. On the contrary, it has raised a more basic and perplexing question concerning the validity of perceptual data as descriptions of actual behavior. In the absence of specific data on the behavioral differences between authoritarians and equalitarians, caution must be exercised in inferring leadership methods or styles from *F*-Scale responses.

Table 3 presents the relationship between the various perceptual meas-

Table 3. Relationship between Drivers' and Positioners' Perception of Supervisor's Relations with Others and Their Attitudes toward Their Over-all Work Situation

	Drivers ($N = 28$ Groups)	Positioners ($N = 24$ Groups)	t_{Diff}
Perception of Supervisor's Participativeness	.54 ***	.31	ns
Perception of Pressure from Supervisor ...	−.41 **	−.24	ns
Perception of Tension with Supervisor ...	−.55 ***	−.08	1.82 *
Perception of Tension between Supervisor and Higher Management	−.41 **	−.43 **	ns
Perception of Supervisor's Influence	.44 **	−.12	2.00 **
Estimate of Frequency of Group Meetings .	−.12	.01	ns
Estimate of Frequency of Individual Contact	.00	.01	ns

*** $P < .01$
** $P < .05$
* $P < .10$
ns = not significant

ures and the most general measure of attitude—attitude toward the over-all work situation. The findings obtained by this analysis are generally consistent with popular notions about effective supervision. Subordinates with most positive attitudes describe their supervisors as more participative, exerting less pressure for high performance, and generally creating less tension in their work relationships. The only measure showing a significant difference in relationships between drivers and positioners is perception of supervisor's influence ($P < .05$). Drivers prefer leaders who they feel have a lot of influence, while there is a slight (but non-significant) tendency for positioners to prefer leaders with less influence.

Comparing Tables 1 and 3, one gets a very different picture of the leader qualities associated with the attitudes of drivers and positioners. Using the *F*-Scale measure, one finds dramatically opposed results in the two situations. Positioners prefer equalitarians; drivers prefer authoritarians. On the other hand, using the perceptions of drivers as a measure

of leader behavior, the findings are much more consistent from one set of groups to the next.

While there are difficulties involved in inferring the leader behaviors associated with both *F*-Scale attitudes and subordinate perceptions, the discrepancy between the two sets of findings seems most easily explained in terms of weaknesses in the perceptual measures. As we have shown, the correlations between subordinates' perceptions and their attitudes (Table 3) and the different relationships between leader *F*-Scale scores and perceptions of leader behavior by drivers and positioners (Table 2) might best be explained in terms of a halo effect. The alternative explanation that authoritarian leaders are behaving democratically with respect to drivers and autocratically with respect to positioners appears difficult to justify.

A large part of research in the areas of leadership and organizational behavior have measured the behavior of organization members through the perceptions of their supervisors, subordinates, or peers. Recently the validity of these measures has been brought into serious question in studies showing little or no agreement between perceptions of the same behavior by different sources (Gross, 1956; Vroom, 1960b) and studies indicating that complex social perceptions are greatly influenced by the needs, attitudes, and role of the perceiver (Stagner, 1948; Vroom, 1959a; Vroom, 1960a). The results of these studies, combined with the findings from the present research, indicate the importance of developing more objective measures of individual and organizational phenomena.

If the present findings are accepted as evidence that drivers and positioners react in markedly different ways to the same leader characteristics, it becomes necessary to determine the characteristics of these two sets of groups which are responsible for the diverse reactions. One type of explanation involves the *personality characteristics of drivers and positioners*. Since these two groups are largely self-selected, it is possible that the differences between their reactions to authoritarianism can be accounted for in terms of personality differences between their members. A previous study (Vroom, 1959b) had shown that the attitudes of persons high in need for independence and low in authoritarianism were most favorably affected by participation in decision-making and most negatively affected by lack of participation. Possibly some of the differences in reactions to authoritarian leadership on the part of drivers and positioners might be due to the fact that positioners had stronger independence needs and were lower in authoritarianism.

To provide a check on this possibility, abbreviated measures of authoritarianism and the need for independence were obtained from drivers and positioners in the original sample seven months after the original data collection. The results in Table 4 show no significant differences on either measure. Positioners tend to be lower than drivers in both au-

thoritarianism and need for independence. While this does not rule out the possibility of other personality differences between these two groups which might be responsible for their different reactions to authoritarianism, it decreases the likelihood of this type of explanation and turns attention toward other situational characteristics.

Table 4. Need Independence and Authoritarianism Data on Drivers and Positioners

		Need Independence		Authoritarianism	
	N	Mean	Variance	Mean	Variance
Drivers	429	17.38	15.11	14.31	16.96
Positioners	153	16.92	11.56	14.24	19.09

A second possible explanation for the different reactions by drivers and positioners concerns the differences in *size of the two groups.* Haire has recently suggested that "as the size of the group increases, the simple ability to hold the group together becomes one of the most important problems . . . with the leader's job being to keep it working as a unit, to keep information flowing through it, and to adjust the parts to one another" (Haire, 1959, p. 184). There is also some empirical evidence (Hemphill, 1950) that as group size increases, tolerance for leader-centered direction of group activities becomes larger.

Since the number of drivers reporting to a single station manager greatly exceeds the mean number of positioners (40.28 as compared with 9.6), it is possible that size differences are reflected in the response to authoritarian leadership. This possibility was explored by capitalizing on variations in size among groups of drivers and positioners. The number of positioners reporting to a single night supervisor varied from 3 to 16, while the number of drivers reporting to a station manager varied from 19 to 64. While there was no overlap between the two sets of groups, it was felt that the variation which did exist might provide a clue as to whether this variable was accounting for differences in responses to authoritarianism.

Table 5 shows the relationship between authoritarianism and attitude toward the over-all work situation for large and small driver work groups and for large and small positioner groups. There are virtually no differences due to size, and so this explanation of the differences in effects of leader authoritarianism cannot be accepted.

Directions for Future Research. There are at least two more possible explanations of the present findings neither of which can be tested with the existing data; they require further research. The first concerns the amount of interaction between supervisor and subordinates. The drivers

have very little contact with their station manager. They see him only for a few minutes at the beginning and end of the day. This time is largely spent exchanging information directly relevant to the job. On the other hand, positioners are in almost continual interaction with their night supervisor. The latter is in a position to supervise the operation constantly, and sometimes he participates in the activity when the work load becomes heavy. In comparison with the station manager, the night supervisor has greater opportunity to establish a more personal relationship with his men and also potentially can exert more pressure on the men to work harder. Conceivably, a supervisor who is unable to supervise the work of his subordinates directly will be liked to the extent that he is seen as having such authoritarian qualities as a tendency to stress his own power and influence in relation to subordinates and provide them with clear-cut structure during their limited interaction. On the other hand, the supervisor who is in direct contact with his subordinates will be liked to the extent that he has such equalitarian attributes as an interest in involving them in decision-making, sensitivity to their needs and feelings, and a reluctance to exert unreasonable pressure for high performance.

Table 5. Relationship between Supervisor's Authoritarianism and the Attitudes toward the Over-all Work Situation of Drivers and Positioners Working in Large and Small Groups

	Mean Size	Number of Groups	Auth. vs. Att.
Drivers			
Large groups	49.2	13	.49 *
Small groups	32.2	15	.41
Positioners			
Large groups	12.2	12	—.38
Small groups	6.9	12	—.34

* $P < .10$

Another possible explanation of the findings involves the notion of work group interdependence. The drivers are highly independent of one another. There is almost no on-the-job interaction between them. Each person can perform his job without assistance from the others, and is paid on an individual incentive basis according to his own performance, regardless of the performance of others. On the other hand, the positioners are highly interdependent. They are in continual interaction with one another, routinely assist one another in the performance of their tasks, and are paid on a group incentive basis.

The more interdependent the members of a work group, the more important becomes the leader's ability to coordinate the activities of

group members and to deal with problems of interpersonal relationships between group members. Since the number of common or shared problems among group members might be expected to be greater in an interdependent group, it seems likely that group rather than man-to-man methods of supervision would be more useful. Conceivably the equalitarian might be more effective at minimizing interpersonal conflicts and stimulating cooperative working relationships. His skills might be of considerable importance in a highly interdependent group but negligible in an operation similar to that of the drivers. On the other hand, the authoritarian might be more effective in creating, through his expectations, a feeling of certainty and structure. This ability might be most important in a group in which the individual is relatively isolated from or independent of his peers.

In the discussion thus far the term interdependence has been used in a rather loose, undefined way. The work organization of drivers differs from that of positioners in at least three respects:

1. *Amount of face-to-face interaction*—the degree to which individuals interact with one another in the performance of tasks.
2. *Interdependence of tasks*—the degree to which the role behavior of one individual facilitates or hinders the role behavior of another person (Thomas, 1957).
3. *Interdependence of goals*—the degree to which goal attainment on the part of one group member facilitates or hinders good attainment on the part of other group members (Deutsch, 1953, pp. 319–353).

The present study must remain inconclusive, not only with respect to the relative importance of supervisor-subordinate interaction and work group interdependence in accounting for the differences in effect of leader authoritarianism, but also in the nature of the interdependence involved. These questions are all subject to empirical examination and the answers must await further research.

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4. A Factor Analysis of Human Needs and Industrial Morale * [1]

Oakley J. Gordon

Summary. When an interested management asks "How can employee morale be measured satisfactorily," . . . "How is morale in my organization," . . . "How can morale be improved?" . . . , the personnel man is faced with a choice of definitions of morale, a choice of methods of measuring it, and a choice of recommendations on how it can be improved. A search of the published writings shows that there is yet no one best answer to these questions. The present article reports another attempt to answer them.

At the beginning of the study it was proposed that high morale be defined as the feeling of well being that an individual experiences when his needs are being filled to his satisfaction. In order to measure how well the employee needs were being filled, a confidential questionnaire was administered to groups of clerical workers at a government installation. In addition, the production records and ratings of these groups were collected.

* Reprinted from *Personnel Psychology,* 1955, 8, 1–18, by permission of the author and of Personnel Psychology, Inc.

[1] The author collected the initial data for this article while temporarily employed as an "expert" attached to the Civilian Personnel Branch of Hill Air Force Base. He is especially appreciative of the co-operation and support given by Mr. Joseph W. Neville, Jr., and Mr. Harold Sinclair of Civilian Personnel, and Mr. Marc Sessions of Division A. Also, the author is indebted to Dr. Calvin W. Taylor, currently with the National Research Council, for making this project available.

It was found that there were three separate needs that were being filled with varying degrees of satisfaction and that each of these played a different role with respect to production and to morale. The definition of morale as proposed was tentatively supported. Further studies are being made to improve the measurement of need-satisfaction and to relate these measures to turnover rate and to programs designed to improve morale, both in clerical and mechanical work.

Defining Morale. As McNemar (11) put it, "There has been an open season for calling a wide variety of things by the name of morale." Some of the more useful definitions of morale have been those that describe it in terms of how it is to be measured. For instance, Harris (6) recently proposed that morale is the attitude of the employee, as expressed on an anonymous questionnaire, toward the company for which he works, with a favorable attitude representing relatively high morale and an unfavorable or neutral attitude representing a relatively lower level of morale. In an earlier study Woods (15) had used a very similar definition and had found it not very satisfactory after being tried in his industrial experiment. However, such a measurable definition is still with us and is apparently working satisfactorily in certain studies. For instance, Katz and Kahn (8), using attitudes as measured by questionnaire items, propose that morale consists of at least four different attitude factors—namely, satisfaction with supervision, satisfaction with job, satisfaction with company, and satisfaction with mobility. The factorial studies of Taylor and Machlin (14) on the *My Job Contest* data, and those of Baehr (1) on the SRA Employee Inventory have outlined similar dimensions of attitudes held by employees toward different aspects of their work.

Note that all of these above studies attempted, explicitly or implicitly, to measure morale in terms of the attitudes of satisfaction that employees feel *toward the things* in their working environment. None of them chose to measure just what it was within the employee that was being satisfied. Yet there are other theoretical definitions of morale that do put the emphasis on the need-satisfaction system within the individual instead of on the stimulus or incentive or the "thing." For instance, Krech and Crutchfield (9) in outlining the "determiners of morale" include the satisfaction of the needs of the individual such as gregariousness or participation, self-expression, recognition, and prestige or status-seeking. This internal approach to morale has been described by Child (3) as the "individual-organic emphasis" with the term morale referring to a condition of physical and emotional well-being in the individual. It is not to be implied that the investigators in the previous paragraph have been unaware of this internal approach. Katz and his colleagues (7) have stated their concern with the difficulty of relating employee satisfaction to human needs or motivation. The present investigation also recognizes, and possibly confirms, this difficulty. However, this study does represent

an attempt to put the focus on the inner, motivational aspect of morale and satisfaction.

Accordingly, the present research design proposed that high morale be defined as the feeling of well-being experienced by an individual when his needs are being filled to his satisfaction. To translate this definition into measurable terms so that it might be tested it was necessary to design a method of assessing the degree of need-satisfaction felt by the employees in a working situation. It was also deemed necessary to obtain a measure of morale by some other method in order to check the validity of the above definition. It is in these two respects then that this study differs from the other current research into morale: 1) the emphasis is placed on what needs within the individual are being satisfied instead of on the objects and conditions in the working environment that might satisfy these needs, and 2) the employees are asked to estimate the level of their morale instead of the investigators being required to infer the morale level from the manner in which the employees answer the attitude questionnaire.

If the measured degree of need-satisfaction and the self-estimated level of morale agree with each other, then such a definition of morale as proposed in this study would offer further answers not only to such questions as, "What is morale?," and "How can employee morale be measured satisfactorily?", but also, "How can morale be improved?" For if we can discover what it is in the employee's internal motivation system that is being undernourished, then we might better know what material or social incentives to add to his working environment. In addition, since the end result of high worker satisfaction might be not only high morale but also high production, a measure of the productivity of the workers was included in the present research.

The Industrial Setting. Before outlining in detail the nature of the variables that were measured in this study, it is necessary to describe the setting. This study took place at Hill Air Force Base, Utah's largest employer of civilian workers. The subjects were all full-time civilian employees of the H.A.F.B. Directorate, Supply & Services and were engaged in clerical and accounting work. The first phase of the study was conducted in Division A [2] and involved all of its groups or units of workers doing productive work. Although there were 179 workers included, they were handled as 21 groups since production records were kept on a group instead of an individual basis. These formal groups ranged in size from 2 to 27 workers, and were physically separated from each other

[2] The writer worked with the people in Division A for several weeks on another project before starting the present study. This chance to get the feel of their situation, and the additional opportunity to review the results of past questionnaires administered to them, had considerable influence on the specific content of the questionnaire items used in this study.

by five foot high partitions. A check study was made in Division B which consisted of 15 units of workers ranging in size from 5 to 30 workers each.

Table 1 lists the 12 variables that were measured in these groups. The first nine could be called "population variables," using Cattell's (2) terminology, since they were obtained by finding the mean scores of the members of each group on the different parts of the attitude questionnaire. The next two measures could be called "syntality variables" since they were obtained from the productive performance of each group acting as a whole—and the last measure, size, could be called a "structure variable" in that it indicates something of the internal structure of each group, at least in terms of how large the groups were.

Variable 1 in the table represents the attempt to have morale assessed independently by the workers themselves. Five questions were designed for this purpose and directly asked the worker about the morale of his work group, of Hill Field, of government installations in general, and of himself. It was believed that there would be a high intercorrelation between the worker's report of his own morale and his report concerning the morale of groups around him, that the worker might project his level of morale onto others. It was hoped that the five questions would give a more reliable estimate of the worker's morale than would a single question. The same hope for reliability led to the use of more than one question in each of the need categories described below.

Need-satisfaction was measured by means of an attitude questionnaire. Undoubtedly better methods can be adapted from the tools of dynamic psychology, but an attitude questionnaire or scale was chosen for this exploratory study since it could cover a larger sample of the workers with a minimum of testing time. Each question asked the worker to express his degree of satisfaction along a scale ranging from 1 to 5, with the 5-end being the highest satisfaction. Many of the questions used were virtually the same as those used by the other investigators mentioned above who were measuring degree of satisfaction with things in the working situation. However, the questions in this investigation were placed into categories according to the need they might best satisfy. This, of course, raises two problems—what are the needs that might be satisfied in the working world, and which attitude questions might best indicate the worker's satisfaction in each of these needs?

Since most American workers are beyond the point of wondering where the next crust of bread will come from, where they are going to rest their heads that night, where the next shred of clothing is coming from, etc., it was presumed in this study that most of the "biological" needs were not important contributors to the proposed definition of morale. It was instead to the variously termed social, acquired, secondary, learned, and psychogenic needs that we turned for the list of needs

to be measured. There is, of course, no one list of such motives from which one can extract those needs pertinent to industry. It was from a variety of lists then that the following needs were proposed for measurement in this study. These are the variables 2 through 8 as given in Table 1.

2. Recognition of the individual: This would include questions that asked the person how well he thought he was being recognized as an individual; how much attention was being paid to his existence and his performance—the questions did not distinguish between recognition that is positive or approving and recognition that is negative or reproaching. Ten questions were designed for this need category. Two sample questions are:

"Are your training, experience and abilities recognized by your immediate or intermediate supervisors on this job?"

"In your job, are you recognized as a human being or treated like a machine?"

3. Structure of expectations: this involves questions to determine how much meaning there is to what the person is asked to do on the job—how well understood are the goals and purposes of the work, how much is known about the present progress toward the goals and sub-goals—how well the worker knows what to expect next. Fifteen questions were designed for this need category. Two sample questions are:

"Are you kept informed as to how well you are doing your job?"

"When your immediate supervisor knows, in advance, of a change in the organization which will affect you, how often does he tell you about it in advance?"

4. Belonging: here fall the questions concerned with gregariousness, the need to feel a part of a group, to be identified with a desirable group, to belong. Fourteen questions were designed for this need category. Two sample questions are:

"Do the people in your unit work together co-operatively, or by themselves independently?"

"Are you made to feel that you are really a part of your section by your fellow workers?"

5. Status, self-opinion, prestige: questions in this area are phrased to ascertain how well the person's need for high self-regard is being met, how much recognition of the individual's satisfactory status is being given by others. Fifteen questions were designed for this need category. Two sample questions are:

"Do you have enough authority and responsibility?"

"Are you assigned to a job that a person can feel proud of—one that he likes people to know about?"

6. Self-expression: this area involves questions concerning the working environment as an outlet for energy, possibly even creative energy—

these questions are aimed more at personal satisfaction than at social approval. Seven questions were designed for this need category. Two sample questions are:

"Does your job allow you to use as much initiative as you feel the need for?"

"Is your present job interesting or uninteresting to you?"

7. Opinion about group leader: here the worker is asked his opinion of his superior—how satisfactorily does his group leader fill the role of one to be followed, one whom the worker can look to for guidance, one that the worker may submit himself to. Six questions were designed for this need category. Two sample questions are:

"How do you rate your immediate supervisor with other supervisors you have worked for? (As a *supervisor*)?"

"In general, how competent is the management at Hill Field?"

8. Comfort: although this represents a more basic biogenic need, five questions were designed for this need category since dissatisfaction is often expressed with the physical environment in industry. Two sample questions are:

"How safe are working conditions in your office or shop?"

"How is the temperature in your immediate working area this month?"

All of the above questions were then scrambled in their sequence as they were placed in questionnaire form so that it was not obvious to the worker that there were any categories of needs or morale. A trial run was made on approximately ten per cent of the workers in Division A. As a result of an item analysis and the comments of the workers sampled, the questionnaire was revised in part and then administered to all employees in Divisions A, and B. All the administrations were done while the workers were on the job, and complete anonymity was assured each respondent. The questionnaire was entitled "Attitudes Anonymous."

The production variables, 10 and 11, were actually composite scores achieved by each group of workers in a monthly contest. In the type of clerical accounting work being performed, the quantity of production was not considered to be a completely adequate measure of group performance. Therefore, Division A devised additional criteria for evaluating the comparative performance of the groups each month. The composite criterion available for use in this study thus consisted of

(*a*) per cent of quota of requisitions filled
(*b*) per cent of quota of items handled
(*c*) number of errors made in handling items
(*d*) currency in documents, reports, and correspondence
(*e*) housekeeping

Weights were attached to these parts by the decision of a committee of supervisors. The parts were summed for each group and the winning

Table 1. The 12 Variables: Their Intercorrelations in Division *A* (Left of Diagonal) & Division *B* (Right of Diagonal)

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Morale	..	86	86	88	81	86	79	65	92	*	*	*
2. Recognition	67	..	86	86	80	81	77	62	92	*	*	*
3. Structure of expectations	76	82	..	93	81	92	80	73	96	*	*	*
4. Belonging	71	70	62	..	90	91	85	69	98	*	*	*
5. Status, self-opinion, prestige	67	86	76	66	..	83	65	43	89	*	*	*
6. Self-expression	80	51	62	68	61	..	75	81	95	*	*	*
7. Opinion about group leader	69	70	68	66	57	60	..	71	85	*	*	*
8. Comfort	41	45	51	20	31	10	31	..	74	*	*	*
9. Total score on questionnaire	86	91	92	82	87	75	80	47	..	*	*	*
10. Production I	14	22	25	02	14	28	−02	12	17	..	*	*
11. Production II	−21	−15	−33	−39	−10	−12	−26	−14	−28	14	..	*
12. Size of work group	−02	−17	−19	−28	−08	−09	−10	−16	−18	−41	−09	..

* Production scores not available in Div. B.
Decimals are omitted throughout the table.
N for Division A = 21 Groups.
N for Division B = 15 Groups.

group was rewarded with publicity after the end of each month. Variable 10, Production I, is the total score earned by each group during the month *before* the questionnaire was administered. Variable 11, Production II, is the total score earned by each group during the month in which the questionnaire was administered. The questionnaire was administered over a period of three days in the middle of the second month.

TABLE 2. ROTATED FACTOR LOADINGS FOR DIVISIONS *A* & *B*

	Factor A		B		C		D		h^2	
	Div. A	B	A	B	A	B	A	B	A	B
1. Morale	81	92	09	43	21	07	45	14	85	87
2. Recognition ..	78	91	62	50	36	04	04	00	97	88
3. Structure of expectations .	80	96	50	28	09	21	40	−01	94	94
4. Belonging ...	88	97	00	37	18	26	−05	18	84	97
5. Status, self-opinion, prestige	72	86	46	60	48	42	06	−03	82	97
6. Self-expression	67	95	−09	13	47	41	44	10	87	99
7. Opinion about group leader	82	86	10	25	01	−05	09	30	68	81
8. Comfort	35	76	45	−20	−09	09	29	28	41	85
9. Total score on questionnaire	93	100	38	38	27	21	23	12	100	100
10. Production I .	00	*	22	*	35	*	44	*	31	*
11. Production II	−41	*	07	*	34	*	08	*	29	*
12. Size of work group	−23	*	−06	*	14	*	15	*	10	*

* Not included in the intercorrelation table.
Decimals are omitted throughout the table.

Treatment and Results. The relationships among the several variables as measured are shown in the form of correlation coefficients in Table 1. In the lower left diagonal portion are the results from Division A—in the upper right are those from Division B. The figures from Division A should be more reliable than those from B, since the former were based on a population of 21 groups, while the latter were based on only 15. The intercorrelation coefficients from each division were subjected to a factor analysis. Thurstone's centroid method of factoring was used on each division's results separately. It was found that the intercorrelations in Division A could be accounted for by four common factors, therefore four factors were also extracted from the intercorrelations from Division B, although three would have been sufficient to account for the common relationships in this division. To prepare the factors for interpretation

they were rotated to approximate simple structure. The rotation was done blindly and separately for each division. The resulting patterns of factors showed some similarity for the two divisions and so are shown combined in Table 2 as four pairs of factors. It is these four (pairs of) factors that will serve as the basis of describing the relationship between morale, need-satisfaction, and production in this industrial setting. In addition, to aid in the interpretation of the nature of the factors, the responses to 23 individual questions from the various need categories were treated separately. These "key" questions were chosen to represent each need category and were correlated with each of these categories. This item analysis permitted a check on the accuracy of the *a priori* placement of the questions into the appropriate categories. It was also possible to estimate the approximate loading in the four factors that each of these key items would have had if they had been included in the factor analysis of the 12 variables.

Interpretation and Discussion. *Factor A:* This seems to be the same factor operating in both divisions—a general factor running through all the need categories contained in the questionnaire. Since the Total Score, variable 9, is the strongest expression of this factor in both divisions, Factor A is interpreted as being a *general satisfaction* of all needs. Also, since this is the one factor in which self-estimated morale, variable 1, loads highly, the definition of morale as proposed for this study is supported. That is, morale does appear here as a function of over-all need satisfaction. This is also the only factor in which variable 12, the size or population of the work groups, appears with any possible significance. The negative nature of this relationship indicates that there is a tendency for the morale and general need-satisfaction of the work group to be lower when the group is larger. A similar finding has been made by other investigators, Katz (7) for instance. Also, the feeling of group belongingness (which could diminish in larger groups) has its most significant loading in this factor. This is in line with previous definitions of morale.

Production scores were not available for Division B since they were kept on a contest basis only in Division A. Since Production I and Production II were virtually uncorrelated themselves, it may be that the effectiveness of this type of contest as an incentive to production was not very strong in this division. At least this is the interpretation suggested by Rothe (12) in his work on incentivation in other industries. Actually this use of the composite production score in a contest between groups had just been initiated in the present divisions. The figures indicate that the announcing of the first month's contest results, Production I, had no effect on this factor of general satisfaction and morale. Subsequently the results of the second month's contest, Production II, appear in a significant negative relationship with this morale factor. If such a negative

trend could be verified as a consistent finding, several explanations might arise: (*a*) those groups whose workers are satisfied with things in general feel no need to take any extra action; (*b*) those groups whose workers are more critical of things in general are actually better producers who perceive the present "inadequacies" of the company as barriers to their progress; (*c*) those units whose workers are dissatisfied in general are those whose supervisors stress production and "get out the work" at the expense of the workers' feelings. Actually such negative coefficients between morale and production have been found elsewhere. Katz and Kahn (8) have found similar negative trends which they explained in terms of (*b*) above. This is not to say that morale is always inversely related to production. Indeed, there are studies that show a positive relationship, for instance, Katz and Hyman's study of shipyards during World War II. However, these findings do serve as a warning that morale and productivity do not automatically move up or down together. One may be improved quite independently of the other in some situations.

Factor B: The remaining factors are not merely further factors in morale. They are independent categories of need-satisfactions and have different relationships with production. Consulting Table 2 we note that the two factors, one from each analysis, that have been paired as being the same Factor B are mainly alike in that variables 2 and 5 contribute significantly to the factor. Admittedly variables 1, 3, and 8 shift the value of their loadings in the two divisions, but even the interpretation of the column from Division A appears to depend quite a bit on the presence of variables 2 and 5 together. This can be seen when one examines the high loading key items and notes the need category from which the items come. These items, with their category or variable number in parenthesis after the item, are as follows: the workers at the high end of this Factor B also feel that they are told about changes before they occur (3), that their abilities and experience are recognized (2), that they are treated like human beings instead of machines (2), that they are given enough authority and responsibility (5), and that they have jobs they can be proud of publicly (5). Since this factor seems to combine portions of variable 2 and 5, it is tentatively identified as *recognition of status.*

The contest results (Production I) announced two weeks before the questionnaire was administered show a very slight positive correlation with this need for recognition of status. This may suggest that the contest tended to be a need-satisfying device as far as this Factor B was concerned. However, the absence of any relationship between the next month's production score and satisfaction in this factor indicate that the groups would not alter their production just to get the social recognition that this contest might provide.

Factor C: It is the appearance of variables 5 and 6 together that seem

to characterize this factor as being the same one operating in each division. Since variable 5 also contributed to the interpretation of Factor B, it is necessary to examine the key items further to understand how this variable could split. It has already been noted which items from variable 5 loaded most highly in Factor B. Those key items from variable 5 which contributed to Factor C instead were concerned with the worker's opinion about his pay in proportion to his ability and with whether his second-level supervisor spoke to him or not. Other high loading key items, with their category or variable number in parenthesis, indicate that those groups of workers high on Factor C are also well aware of the purpose of their job (3), are told about changes ahead of time (3), are satisfied with their job (1), and feel that their job allows them to use as much initiative as they desire (6). This last item was the only one of the three key items chosen to represent variable 6 that loaded in this factor. The other two fell into Factor D.

Remembering that the *a priori* label for variable 5 was "status, self-opinion, prestige," it would appear that the status and prestige portion split off to become social recognition of status in Factor B, and that the self-opinion portion joined with a portion of self-expression from variable 6 to form Factor C. Factor C is therefore tentatively identified as the need for *self-respect*. That is, it is suggested that Factor C involves a more internal acknowledgement of one's position in the world of work, while Factor B deals more with the external or social recognition. There is some other evidence for the existence of two such factors in employee motivation. Harrell (5), for example, has stated that the two most important social motives in industry are social approval and self-respect. Stagner (13) has said that status is the key motive in both industrial workers and managers. Katz and Likert have suggested that there is a difference between external motivation, e.g., praise and punishment from outside the person, and internal motivation such as the need to be employed in interesting work and doing that job well.

Both the "antecedent and consequent" Production score, i.e., variables 10 and 11, correlated positively with Factor C. Therefore it would appear that the production contest both affects and is affected by this hypothesized need for self-respect. That is, there is a tendency for the workers' "self-respect" to go up as their contest score goes up and a tendency for their contest performance to go up as their "self-respect" increases.

Factor D: There is no pair of factors, one from each Division's analysis, that can be called the same Factor D. The remaining factors from each analysis have been paired under the label of Factor D in Table 2 only for comparison. Not only are these two factors not the same, but the one from Division B is probably only a residual factor not capable of further identification. However, the factor from Division A is worthy of some speculation as a Factor D in this study. Its importance is seen in the sub-

stantial correlation between this factor and variable 10, Production I. The identification of this factor is not clear. It is in this column that variable 6 makes the rest of its contribution. An inspection of those key items chosen to represent this variable 6 indicates that workers who are high in this factor tend to feel at the end of the working day that they have done a good job, that they have satisfied themselves individually even if no one else knows it—and they feel they have interesting jobs to do. This may be a factor resembling the need for self-expression. Whatever it is, it tied in with the workers' self-estimated morale and with such expectations as the possibilities of promotion. Also, it would appear that while the announced results of the previous contest may have helped this feeling, the motivation level itself did not show any relation to the subsequent month's production scores.

Remarks. It has been convenient in the above interpretations to speak of the variables and factors not only by number and letter but also by name. It must be remembered that we are much more certain of the numbers and letters than we are of the names. There has also been considerable reference in the above paragraphs to the "causes" and "consequences" of the announced production scores. It must be remembered that the presence of an event before or after a given psychological measurement does not automatically mean that the antecedent has caused the subsequent event. Similarly, although there is a place in the development of good theories of industrial behavior for such "intervening variables" as needs and attitudes that we hypothesize to exist inside of men, we must remain ready to alter our hypotheses and our theories when further studies indicate a revision. Follow-up studies are being carried on with the above material in an effort to test the present results and to relate these to other available measures of human behavior in this industrial setting.

Technical Notes. The Pearsonian coefficients between the various measures were, of course, computed across groups instead of across the individual members of each group. Hence the mean scores of each group represented the group's performance on the first 9 variables. According to Garrett (4) among others, this sort of correlation between means becomes *inflated* or spurious because the large number of factors which ordinarily reduce the correlation within a single group cancel out when averages are taken from group to group. One wonders if it might not be more "genuine" than spurious for certain factors to cancel out.) Yet, at the same time, the range of scores obtained by the groups is not going to be as large as the range of scores obtained by the people comprising the groups. A restriction of range should tend to *reduce* the correlations between the groups.

Actually, an inspection of the intercorrelation matrices for each of the two divisions of workers suggests that the coefficients became larger as

the number of groups became smaller and the size of each group became larger.

This apparent spuriousness, and its affect on Division B in particular, had its influence on the rotation of the extracted factors. As Cattell has cautioned, the greater than usual amount of "play" in the correlations will proportionately blur the hyperplanes. Hence, the factoring in Division B was continued beyond the three factors that seemed sufficient, and the search for simple structure was permitted to stop when the loadings defining the hyperplanes were down below .30 as if they were essentially zero projections.

The general factor appearing in each analysis was placed about orthogonally in relation to the remaining factors. The highest cosine between any two vectors in Division A was .23, and in Division B was .34.

Conclusions

Using an attitude-type questionnaire to get at the degree of satisfaction of the human needs which nourish such attitudes, this study attempted to measure the need-satisfaction of a sample of civilian workers at a large military installation. These measures were then compared and related to measures of self-estimated morale and of group productivity. The following conclusions can be drawn:

(1) Although the questionnaire attempted to measure the satisfaction of seven familiar needs, the results were so interrelated that only three factors were required to account for most of the group differences in the original seven need categories.

(2) The three factors—broader, more basic categories—were tentatively identified as (A) overall satisfaction with need fulfillment, (B) need for social recognition of status, and (C) need for self-respect.

(3) Since the workers' self-estimated morale was almost singly associated with the first factor, overall satisfaction with need-fulfillment, this factor A may also be identified as general morale. This constitutes a measurable definition of morale as the feeling of well-being held by an individual when his needs are being filled to his satisfaction as indicated on this questionnaire.

(4) The two measurements of group productivity, one measurement antecedent and one subsequent to the administration of the questionnaire, were not significantly correlated with each other. However, the antecedent production score was related positively to the "need for self-respect" and the "need for social recognition of status." It was not related to "general morale." The subsequent production score was related negatively to "general morale" and positively to the "need for self-respect," with no relationship to the "need for social recognition of status."

(5) These findings can lead to suggestions for programs of action. By

noting which needs are not being met in the various groups of workers, steps can be taken to better satisfy these needs. The ability to satisfy needs has often been described as the chief attribute of leadership. Group instruction in human relations, such as the course outlined by Maier (10), can be offered as refresher courses for foremen and higher level supervisors. Further, in view of the noted relationships, management may expect certain need-fulfilling programs to affect morale and others to affect production. This sort of program is now being carried out as part of a follow-up study at Hill Air Force Base.

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Part Three: PERSONNEL SELECTION

1. A Simplified Method of Computing the Effectiveness of Tests in Selection *

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The actual usefulness of a psychological test in predicting a given criterion of job success depends both on validity and the percentage of applicants who are selected. A test with relatively low validity, under conditions in which the selection ratio is low, may select more efficiently than does another test with relatively high validity but under conditions in which the selection ratio is high.

Tables developed by Taylor and Russell (3) indicate the proportion of employees who will be satisfactory when selected on the basis of a test under varying conditions of validity and for varying selection ratios. This proportion is dependent on the proportion of present employees considered satisfactory.

Smith (2) has suggested certain cautions in the use of the Taylor-Russell tables. They apply only in the case of an elliptical correlation scattergram. Since triangular scattergrams are common, results derived from the tables may be misleading.

Interpreting the usefulness of tests in prediction by the Taylor-Russell method involves (*a*) the computation of a coefficient of correlation between test scores and criterion scores, (*b*) access to the tables, and (*c*) the assumption (according to Smith frequently not valid) that the test scores and criterion scores yield an approximately normal bivariate distribution.

The Problem. Many users of employment selection tests are not accomplished statisticians. Some of them may be able to compute correlation coefficients; others may not. It is suggested that it would be advisable to provide such persons with a simple but *adequate* method of determining the usefulness of prediction devices. The method ideally should be as simple as possible to compute and should result in a figure that is

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meaningful to the person computing it and easily explained to others.

If we may accept textbooks in industrial personnel psychology as indicators of teaching practice, we seem to be providing no means of evaluating test validity for the student who is not an accomplished statistician. Yet, in practice, selection tests are and no doubt will continue to be used by the statistically unsophisticated. Welch, Stone, and Paterson (5) have provided a simple method for developing a weighted application blank. Their method involves no complicated statistical formulas. It involves the computation of the predictive efficiency of application blank information by means of a direct comparison of successful and unsuccessful employees in a try-out group. A somewhat similar method is here proposed for determining the predictive efficiency of selection tests.

Method. What one really wishes to know about a selection test is: How much more efficient is selection if we use this test than if we do not use it? This question can be answered by using a simple device. Administer the test and secure criterion measures for a try-out group. Select a cutting point on the test. Select a cutting point on the criterion. Count the number of cases falling above both cutting points—test and criterion. Compare this number with the number that would have been secured by random selection.

If 50% of employees are considered satisfactory and selection is made on a random basis or by using some method totally lacking in validity, then, regardless of the selection ratio, 50% of those we employ will be satisfactory. If by selecting on the basis of the test we find that actually 70% of those selected prove satisfactory, we have improved selection. Seventy per cent satisfactory selection is 40% better than 50% satisfactory selection. The use of our test has improved selection by 40% over chance (or over the method previously used). Even though the previous method of selection had some considerable degree of validity, this method will indicate the percentage of improvement, if any, over previous selection.[1]

For practical purposes is this not all we need to know? Why try to teach a person, himself statistically rather naive, how to explain the significance of a correlation coefficient? The use of the Taylor-Russell tables requires that a correlation coefficient be computed. To compute the correlation, complete data on a try-out group are necessary. Yet results can be obtained directly from the data without using the more arduous method of computing the correlation and inspecting the tables.

Comparison with Taylor-Russell Method. In practice, however, the predictive efficiency of the test obtained from the direct method com-

[1] Bellows and Rush (1, p. 51) express this as the formula, $c = (b - a)/a$, in which a is the percentage of satisfactory employees without the test, b is the percentage of satisfactory employees with the test used under conditions described, and c, then, is the percentage of improvement.

monly differs from that obtained from the Taylor-Russell tables. The differences in results do not necessarily indicate that the direct method is the less accurate. It has already been mentioned that the Taylor-Russell method is based on an assumption of a normal bivariate surface. This assumption, in practice, is possibly—in fact quite probably—not justified.

The problem of the standard error of estimate is inherent in both methods. To determine which method is the more adequate requires successive try-out groups on similar populations. Successive try-out groups are difficult to obtain in an actual industrial situation. Industrial management is not ordinarily friendly toward the continued administration of a test to applicants without the use of the results in selection, particularly if it has already been demonstrated that the test has a useful level of predictive efficiency.

First Experiment. To secure a comparable situation to test the relative adequacy of the Taylor-Russell method and the direct method, data obtained from students in elementary psychology courses for three successive semesters were used. Scores on the Civilian Form of the Army General Classification Test were used as representative of a selection test and the total of the raw scores on five course examinations (the basis of the course grade) as the criterion. Enough data were available to provide for a try-out group and two successive follow-up groups.

The results are shown in Table 1. Columns A and B indicate arbitrarily chosen conditions of selection ratio and proportion of the present group considered satisfactory, respectively.

The try-out group consisted of 128 students. The coefficient of correlation obtained between the test and the criterion is $r = .48$. Using the Taylor-Russell tables the percentages predicted to be satisfactory for the conditions given were obtained and are given in Column C. Column D indicates the percentage satisfactory found by direct inspection of the data and used as a predictor.

The purpose of either method is to predict the percentage satisfactory in future selection. Columns E and F indicate the actual percentages satisfactory in two follow-up groups under the same conditions. The differences between predicted and obtained percentages for each of the two methods are shown in Columns G, H, I, and J.

The averages for Columns G and H indicate that the average errors in prediction by the Taylor-Russell method for the two follow-up groups were 9.7 and 5.3, respectively. The average errors of the direct method were 10.0 and 5.6.

It is apparent that the simpler, direct method has predicted approximately as accurately as the more cumbersome Taylor-Russell method.

Further Experiments. Data in as large numbers or on more than one

follow-up group were not available from within an actual industrial context. However, sets of data, small in number of cases, were secured to provide further checks on the method.

The Wonderlic Personnel Inventory was administered to a group of 34 aircraft workers. The coefficient of correlation between test scores and a criterion of supervisor's ratings was $r = .57$. The same test was administered to a follow-up group of 16 workers in the same plant. Using selection ratios of .30, .40, .50, and .60 and proportions satisfactory of .50, .60, .70, and .80, the average error in prediction was 3.8 for the Taylor-

Table 1. Comparisons of Accuracy of Prediction from Taylor-Russell Tables and by Direct Method

Selection Ratio	Proportion Satisfactory	% Satisfactory Predicted from Try-out Group ($N = 128$)		% Actually Successful		Differences between			
		Taylor-Russell Tables When $r = .48$	Direct Method	Follow-up Group 1 ($N = 90$)	Follow-up Group 2 ($N = 86$)	C and E	C and F	D and E	D and F
A	B	C	D	E	F	G	H	I	J
.20	.50	77	75	53	67	24	10	22	8
.20	.60	85	82	68	72	17	13	14	10
.20	.70	91	89	79	83	12	8	10	6
.20	.80	96	93	89	100	2	4	4	7
.20	.90	99	100	89	100	10	1	11	0
.30	.50	73	76	56	67	7	6	20	9
.30	.60	81	80	67	70	14	11	13	10
.30	.70	88	85	74	85	14	3	11	0
.30	.80	94	90	81	96	13	2	9	6
.40	.50	69	75	60	65	9	4	15	10
.40	.60	78	82	69	71	9	7	13	11
.40	.70	86	86	74	82	12	4	12	4
.40	.80	93	90	80	88	13	5	10	2
.50	.50	66	67	58	65	8	1	9	2
.50	.60	75	77	64	70	11	5	13	7
.50	.70	84	80	76	81	8	3	4	1
.50	.80	91	86	87	88	4	3	1	2
.60	.50	63	66	62	58	1	5	4	8
.60	.60	73	77	67	69	6	4	10	8
.60	.70	82	80	76	76	6	6	4	4
.60	.80	90	86	87	84	3	6	1	2
					Average	9.7	5.3	10.0	5.6

Russell method and 5.7 for the direct method. These results are shown in Table 2.

Through the courtesy of the authors, data were made available from two published sources.[2] Bellows and Rush (1) have published clerical aptitude test scores and criterion scores for 60 workers. In the present study the first 30 cases were treated as a try-out group and the last 30 cases as a follow-up group. The same selection ratios and proportions satisfactory were used as in the case of the aircraft workers. The average errors in prediction are shown in Table 2.

Table 2. Comparison of Average Errors of Prediction for Taylor-Russell Method and Direct Method for Three Groups (50 Aircraft Workers, 60 Clerical Workers, and 46 Machine Operators) of Industrial Employees

Data Source	*r.*	Try-out Group *N*	Follow-up Group *N*	Average Error in Prediction		Selection Instrument
				Taylor-Russell	Direct Method	
Aircraft Co.	.59	34	16	3.8	5.7	Wonderlic Personnel Test
Bellows (1)	.57	30	30	9.0	2.2	Clerical Aptitude Test
Tiffin (4)	.36	23	23	7.5	9.1	Bennett Test of Mech. Comprehension

Table 2 also presents results using published data from Tiffin, similarly treated. Of 46 cases for which predictor and criterion data were given, the first 23 were used as a try-out group and the remainder as a follow-up group.

Discussion. Several sets of try-out and follow-up data involving predictor and criterion scores have been presented. For each set of data predictions have been made of the percentage of workers, selected under varying conditions, who will be satisfactory. For making such predictions, two methods have been used, the Taylor-Russell method and a simpler direct method. The actual number of selected workers who were satisfactory was determined for each situation with a follow-up group. Results predicted with the Taylor-Russell method and results predicted with the direct method were compared with actual results. In some cases the Taylor-Russell method was more accurate, in some the direct method was more accurate. While the average errors of the Taylor-Russell method were, on the whole, slightly less than the average errors of the direct method, the differences were small.

[2] The writers wish to express their appreciation to Dr. Roger M. Bellows and to Dr. Joseph Tiffin for permission to use data from their respective studies.

It is concluded that the differences in results obtained by the two methods are so small and so variable that the simple, direct method might well be substituted for the more difficult and cumbersome Taylor-Russell method of computing the effectiveness of tests in selection.

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2. The Validation of Selection Tests in the Light of the Dynamic Character of Criteria *

Edwin E. Ghiselli
Mason Haire

When we validate selection tests, we typically relate scores to some measure of job performance obtained during a brief initial period of employment. This initial period may be as short as the first two or three months of employment, and it seldom is as long as the first two or three years. Presumably the men are hired for a much longer period. The rationale of our validation procedure involves matching a predictor variable with a criterion. But, does the brief criterion itself predict the one we are interested in—performance over a relatively long period? To be sure, criterion scores for the initial period indicate the contribution workers have made during that time, but this is not exactly what we want to measure. At least implicitly, early criterion data are taken to stand for ultimate performance or total performance on the job. The period se-

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lected for a criterion is usually determined by practical considerations such as the availability of data. The question to which this paper addresses itself is: Do tests validated against such a brief initial criterion maintain their validity over a longer period of measured performance? There are indications that they do not (Worbois, 1951).

The practice of using performance data obtained during an initial period and letting it stand for ultimate or total performance completely ignores the dynamic character of the criterion and important changes that are taking place in the worker's performance. Over a considerable length of time on the job, there is not only a change in average performance, but also significant changes in the order of individuals in their performance. The change in average performance may be much more than we are used to thinking; we are used to laboratory tasks which can be mastered in an hour or so. On the job, performance may improve for many months or even years (Farmer & Chambers, 1929; Ghiselli & Brown, 1947). In one case, the authors have followed the progress of a group of investment salesmen for ten years. During this extended period there was 650 per cent improvement in average productivity and still no evidence of leveling off. Indeed a straight line would fit the whole data well. If there are significant changes in order within such a period of improvement, early validation will be seriously misleading. A good many studies have indicated such a change in order. Contiguous stages of learning typically correlate much higher than periods separated by some time (Du Bois, *et al.*, 1959). Factorial analyses of learning data clearly indicate a change in weighting of factors for different periods of the learning process (Fleishman & Hempl, 1954). All of these things suggest that early criterion data do not measure all of the important variables in performance.

With the average performance and rank order of individuals both changing, one is tempted to turn to the rate of improvement as a criterion. If ultimate or total performance is our goal, rate may be a useful substitute. To wait for final performance is impractical; even maximal performance may be so far off that it delays the validation of new instruments impossibly. There is some evidence that final level is predicted by rate of improvement, so, even though it indicates little about an individual's level of performance during the initial period, it may be more indicative of final values than the early criterion itself. In view of the difficulties encountered with a partial criterion which does not predict the ultimate criterion, this study will examine, in a particular case, the validation of tests for the prediction of differential rates of improvement.

Methods and Procedures. The subjects used in this investigation were 56 men who were employed as taxicab drivers. None of the men had had any previous work experience either as a taxicab driver or even as a dispatcher, chauffeur, bus operator, or truck driver. At the time of hiring

the men took the following pencil-and-paper tests: arithmetic, speed of reactions, tapping and dotting, judgment of distance, distance discrimination, mechanical principles, and inventories designed to measure occupational level interests, interest in outside occupations, interest in occupations involving dealing with people, and interest in active occupations. These tests have been described in detail elsewhere (Brown & Ghiselli, 1949).

Production in terms of the dollar volume of fares collected was used as the criterion of job performance. Productivity data were collected for each of the first 18 weeks of employment. Since labor turnover is high in this job, a longer criterion period was not feasible. Inspection of the curves of production during the 18 weeks period for individuals and for the average of all drivers indicated no significant curvilinear trend. Rather a straight line seemed to describe the change in performance during the criterion period quite adequately. Therefore, as a measure of rate of improvement, a straight line was fitted through the data for each individual for the 18-weeks period and the slope of the line was taken as an index of the rate of improvement.

Results. The mean of the production indices for the 54 drivers for the initial 3 weeks was 89.0 and the standard deviation was 15.4. For the last three-week period the mean was 104.8 and the standard deviation was 22.1. The average of the intercorrelations among the production indices for the 18 weeks was .57, and the coefficient of correlation between productivity on the first and eighteenth weeks was only .19. It is therefore clear that during the 18-week period there were important changes in average productivity, in the range of individual differences, and in the order of individuals.

Table 1 gives the coefficients of correlation between scores on the various tests and: (a) productivity during the first and last three-week period, (b) productivity during the entire 18-week period, and (c) rate of improvement in productivity during the 18-week period. In view of the changes in productivity and in the order of individuals, it is not surprising to find that the validity of some of the tests changes significantly during the 18-week period. Figure 1 gives some examples. In this figure the validity of a test is given for successive three-week periods. It can be seen that the validity of the distance discrimination test gradually increased and reaches a high point about halfway through the learning period. The inventory designed to measure interest in dealing with people shows an initial high level of validity followed by a rapid decline. The validity of the test of mechanical principles appears to fluctuate in a cyclical fashion. Finally, the validity of the arithmetic test remains relatively constant throughout the entire period.

If we look at Table 1, it is clear that we could make up a reasonable

battery of tests to predict performance for the first six weeks. Six tests yield validity coefficients above .25 for performance during the first three weeks. These tests are arithmetic, speed of reactions, tapping, mechanical principles, occupational level interest, and interest in dealing with people. Their average validity regardless of sign is .36. Considering the fact that the intercorrelations among these tests is only .19, it is apparent that they would form an excellent composite of predictors. However, these same tests predict performance during the last three weeks with an average validity of only .09. The battery that predicts early performance, then, falls down badly on the prediction of later achievement. Similarly, there are three tests that give validity coefficients above .25 for the last three weeks. These tests are dotting, distance discrimination, and interest in active occupations with an average validity of .29. The average of their intercorrelations is .13 so that they, too, would be an effective battery. The average validity of these three tests for the first three weeks, however, is only .03. It is to be noted that no single test would be included in both batteries.

TABLE 1. VALIDITY COEFFICIENTS OF THE VARIOUS TESTS FOR DIFFERENT CRITERIA

Test	Production During			Rate of Improvement in Production
	First 3 Weeks	Last 3 Weeks	All 18 Weeks	
Arithmetic	.27	.14	.28	—.22
Complex Reactions I	—.40	.00	—.18	—.06
Complex Reactions II	—.07	—.23	—.15	—.06
Dotting	.18	.31	.21	—.13
Tapping	.27	.15	.18	.24
Judgment of Distance	—.02	.23	—.14	.00
Distance Discrimination	—.18	.29	.25	.06
Mechanical Principles	.29	.06	.13	.51
Occupational Level	—.49	—.08	—.13	.00
Outside Occupations	—.18	—.03	—.08	—.22
Dealing with People	.42	.13	.12	.06
Active Occupations	.09	.26	.09	.46

Earlier in the discussion the point was made that rate of improvement during the period in which the worker is learning the job might be considered to be a better criterion of job performance than total production during that period. Even though, logically, rate of improvement might be superior to total production as a criterion, to be useful it must be predicted by selection tests. Even if it can be predicted, it is necessary to ascertain whether the tests that predict it well are also those tests

which predict total production equally well. If tests that are valid for rate of improvement are also those which are valid for total production, then as far as selection is concerned no problem exists.

The last column of Table 1 gives the validity coefficients of the various tests for predicting rate of improvement. Examination of these coefficients shows that several tests show promise in predicting rate of improvement. Indeed, the two highest validity coefficients in the entire table are for

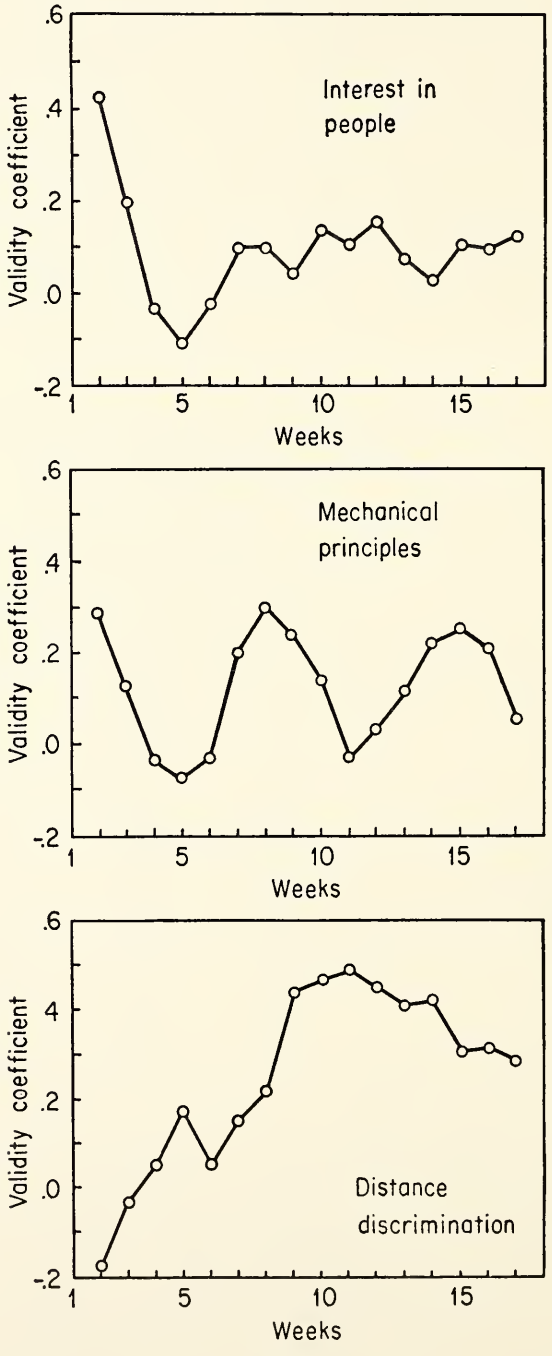

FIG. 1. Changes in the validity coefficients of three tests during the first three weeks of employment.

predicting rate of improvement. It is therefore apparent that rate of improvement is a predictable criterion.

In the next to the last column of Table 1 are listed the validity coefficients for total production during the eighteen-week period. A comparison of these coefficients with those for rate of improvement shows little similarity. For total production the two tests with validity coefficients of .25 or higher are arithmetic and distance discrimination, whereas for rate of improvement the two tests with validity coefficients of .25 or greater are mechanical principles and interest in active occupations. The validity coefficients of the first two tests for rate of improvement are only —.22 and .06, and the validity coefficients of the second two tests for total production are only —.08 and .09. It is therefore apparent that a battery of tests devloped to predict one of these criterions optimally will be very poor in predicting the other.

Summary and Conclusions

1. It is suggested that the dynamic nature of the criterion of job performance presents real difficulties in using initial measures. If the desired criterion is ultimate or total performance, there is some question whether an initial criterion measure will itself be a good predictor. If not, validation against this early criterion is no validation at all.

2. Data are presented showing, in a particular case, job performance over a period of time. During this time significant changes occurred in the average performance, the variance, and the rank order of workers.

3. Validating a battery of tests against the criterion data obtained, it is possible to predict the first three weeks of performance, or the last three weeks, but it is not possible to predict both with the same battery. The tests show various patterns of validity: low validity in initial periods, rising later; high validity in initial periods falling later; and cyclical variations in validity measured against successive stages in performance.

4. In these data, it is possible to predict rate of improvement with some success, but, over the brief period investigated, rate is not strikingly associated with total production.

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3. Criterion Measurement and Personnel Judgments *

Robert M. Guion

In their review of the year's literature, Wallace and Weitz (1955) suggested that more talking was being done about "the criterion problem" than research. Despite all of the verbal attacks on this problem, they concluded, most workers still accept the most convenient criterion with the hope that it will turn out to be all right. The present note is in the tradition observed by the Wallace and Weitz survey; it is a discussion of an approach to the problem, not a report of concrete research!

A first point of view to be made explicit in this discussion is that the solution to the criterion problem does *not* lie in the typical efforts at statistical refinement. Much of this has been blind numerical manipulation. If we are honest, we will describe many of the very complex criterion refinements with the words, "We don't know what we are doing, but we are doing it very carefully and hope you are pleased with our unintelligent diligence" (Wherry, 1957, p. 1).

The Present Status of Criterion Measurement. Most efforts at personnel prediction start (at least implicitly) from a judgment about the nature of some "ultimate criterion" (Thorndike, 1949; Fiske, 1951) of what may be called the general satisfactoriness of personnel performing some specified function within an organization. This ultimate criterion is a complex array of skills, interests, motives, attitudes, and other imponderables along with the whole gamut of specific behaviors appropriate to the job. Conceptually, the ultimate criterion can apparently be defined as "the total worth of a man to the company—in the final analysis." Such an abstraction is not measurable—at least not until the man's total career with an organization has finally been terminated!

Therefore, an acceptable substitute is usually deemed necessary. The search for such a substitute may begin by examining job descriptions and by making some kind of subjective judgment or analysis of the needs of

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the organization. At best, the present status of techniques of job and need analysis leave much to be desired; typical techniques of job and need analysis are seldom the best when one is merely seeking some clues about possible criteria! Typically, in fact, the whole sequence of criterion selection goes something like this:

1. The psychologist has a hunch (or insight!) that a problem exists and that he can help solve it.
2. He reads a vague, ambiguous description of the job.
3. From these faint stimuli, he formulates a fuzzy concept of an ultimate criterion.
4. Being a practical psychologist, he may then formulate a combination of several variables which will give him—as nearly as he can guess—a single, composite measure of "satisfactoriness."
5. He judges the relevance of this measure: the extent to which it is neither deficient or contaminated (Cf. Nagle, 1953).
6. He may judge the relative importance of each of the elements in his composite and assign some varying amount of weight to each.
7. He then finds that the data required for his carefully built composite are not available in the company files, nor is there any immediate prospect of having such records reliably kept.
8. Therefore, he will then select "the best available criterion." Typically, this will be a rating, and the criterion problem, if not solved, can at least be overlooked for the rest of the research.

In short, the sequence of events involved in the usual selection of a criterion involves a series of judgments on the part of the personnel research worker, culminating in the decision to use someone else's judgment as the criterion. This means, then, that the whole superstructure of personnel research—with its multiple correlations and confidence levels and other trappings of a quantitative, scientific methodology—is built upon the weakest of foundations: a residual judgment. (Parenthetically, it must be recognized that ratings may provide excellent criteria when properly applied and carefully worked out. But when ratings become the residual technique—the technique to use after everything else has been rejected because of *obvious* inadequacy—then one may be permitted a raised eyebrow when one reads in the journal, "The best available criterion was the instructor's rating." If a rating is indeed the best available criterion, then of course a personnel researcher must do the best he can under the situational limitations. But he should not delude himself that he has solved the criterion problem.)

Even in more desirable circumstances, where the finally selected criterion is not residual but does indeed conform to the judgments made in the first half-dozen steps of the sequence, the superstructure of research results may rest on a very shaky foundation. Ignore, if possible, the ever present possibility of poor judgment. There still remains the problem of

changing circumstances. Changes in the general economy, in the company's competitive position, in the labor market, or (often overlooked) in the distribution of skills or traits within the organization itself are very likely to occur. Such changes may in turn influence one's "expert judgment" about the relative importance of the various elements that make up one's composite criterion measure. Consider, as one example, a company beset by customer complaints about quality of workmanship. If it initiates a personnel research program to help solve its problem, it will need a criterion—and the ultimate criterion must include not only the quality element but a quantity measure as well. In judging the relative importance of these two elements, at such a time, it is quite possible that a sound judgment might consider the quality measure to be perhaps two or three times as important as quantity. Selection research (and perhaps training or administrative changes) are then validated against this criterion, the variance of which is perhaps 70 per cent atttributable to quality measures.

If the research is successful, and if the results are incorporated into the employment procedure (and other personnel practices), then in due time the organization should have a highly "quality-conscious" work force. Customer complaints should become markedly reduced and, as in other fairy tales, everyone should live happily ever after.

In most companies, however, there comes a time for a second chapter, and in this chapter the problem that has been solved is quickly replaced by a new one to solve. In the example company, for instance, the emphasis on quality may have resulted, in time, in a deliberate, careful work that moves slowly enough to endanger the company's competitiveness in pricing. While quality is still an important element, its relative importance may therefore shrink enough to reverse the earlier ratio. If this happens, then all of the validation work done with the original weighting needs to be done again with the revised criterion.

The argument of this note is simply that the judgment of relative importance of criterion elements is typically made too soon.

Multi-dimensionality of Criteria. The variety of criterion selection outlined in the foregoing is based upon the idea of a single, over-all ultimate criterion which must somehow be duplicated in the criterion measure actually employed. This idea assumes a generality in criteria analogous to a general factor in intelligence.

Criteria, however, exist along many dimensions, not just one. A major landmark in our collective awareness of this point is the article by Ghiselli (1956), "Dimensional Problems of Criteria." Although there has been much recognition of criterion dimensionality at any given time, Ghiselli has gone further in introducing the concept of "dynamic dimensions" of criteria. The concept here is that the dimensions along which perform-

ance occurs may change as a result of experience. This idea is supported by findings in one organization known to the writer. In the organization it was found that tests which can predict sales performance during the first year of employment are different tests from those which predict sales performance after five years. Clearly, first year sales and five year sales are not equivalent criteria. The reason is not as clear. What are the single, identifiable dimensions of sales performance that have changed in this period of time?

Such dimensions must be clearly defined and isolated if marked improvement in personnel selection techniques are to be made. This implies that personnel research must be multidimensional in its dependent, criterion measurement as well as in its independent, predictor measurement. The old insistence of the laboratory for a single dependent and a single independent variable may have worked well with rats and mazes, but it is not appropriate to the study of the functioning of the human organism in his many-faceted world of making a living.

Successful multivariate research demands clear knowledge of each of the component parts. Each must be not merely definable, but reliably measurable as well. There is a profound difference between sound multivariate research, depending upon systematic handling of the variables included, and the verbal, conceptually over-cooked hash that is today's typical "composite criterion."

Too long and too frequently the doctrine is accepted that a single, overall criterion is indispensable (Nagle, 1953; Toops, 1928). The second argument of this note is that this doctrine should be rejected; in many situations it is doubtful if the doctrine of a single criterion is even sensible, let alone indispensable.

A broad and useful definition of a criterion is behavior, or consequences of behavior, that one wishes to predict. The fallacy of the single criterion lies in its assumption that everything that is to be predicted is related to everything else to be predicted—that there is a general factor in all criteria accounting for virtually all of the important variance in behavior at work and its various consequences of value. Considering that there are two broad classes of criteria, satisfaction and performance (Katzell, 1957), this assumption is obviously silly in view of the often-noted failure to find significant correlations between these two classes of variables (Brayfield and Crockett, 1955). Even within the job performance domain, the assumption of a general factor is frequently not tenable. Within the domain of job satisfaction, evidence does suggest the existence of a general factor (Wherry, 1958). The same evidence, however, also points to a number of other reasonably invariant factors which also account for appreciable portions of the total satisfaction variance.

Where criterion elements or dimensions are shown to be related, then

there may be some point in combining them into a general composite. Where they are clearly independent, however, then prediction should also be independent.

Job and Need Analysis. The identification of criterion elements and the determination of their independence levels can be accomplished through some form of factor analysis. Factor analysis, however, requires data. The data from which clear identification of criterion elements must come are collected in job analysis and in the analysis of organizational needs.

The basic question of job analysis is, "What is the nature of the behavior called for by the job or the employment situation?" A corollary question in criterion selection is, "What is the degree of correspondence between the behavior called for and the behavior actually exhibited?" In analyzing needs, the basic question is, in a value-judgment sense, "What consequences should on-the-job behavior produce?" The corollary question for criteria is, "To what degree does each individual's behavior actually lead to these desired consequences?"

These questions indicate that criteria can be classified either as behavior data or as result-of-behavior data. Such a classification is related to, although not identical with, the job analysis classification suggested by McCormick (1959) with his job-oriented and worker-oriented job elements. It seems quite plausible that future research may find that job-oriented job analysis may be preferable for identifying the majority of the result-of-behavior criterion dimensions, and that these will be what Ghiselli (1956) termed the static dimensions, while the worker-oriented job analysis may be more effective in identifying the behavior dimensions, and that these may prove to be the "dynamic dimensions." This is, of course, mere speculation. What can be said now with conviction is that much work must be done to improve techniques of job analysis, and to develop and improve techniques of situational need analysis, before such dimensions can be clearly identified, isolated, and objectively and reliably measured.

The Role of Judgment. The development of better techniques of job analysis with resulting increased emphasis upon actual worker behavior does not remove judgment from the process. The complete process of criterion development calls for two varieties of value judgment: (*a*) the judgment that a particular form of behavior or result of behavior is good or desirable[1] (*b*) that one behavior or result is more or less or equally desirable compared with another.

A major problem in criterion development, therefore, is to find means by which these judgments can be improved. A whole program of person-

[1] Typically, this is a linear judgment; that is, it is judged that if more of something is good, then still more of that something must be better. The wisdom of this assumption needs to be questioned, but that, happily, is beyond the scope of this paper.

nel research will stand or fall upon the adequacy of the initial judgments which are made.

The first type of judgment can be made more effectively by persons who are well informed. The fund of information should include a clear formulation of the objectives of the organization (Fiske, 1951; Bass, 1952) —a matter for top level policy determination. It should also include definite facts about the relationships between specific behaviors on any given job and those organizational objectives—a matter for objective, descriptive research. Fiske (1951), as a matter of fact, suggests that clear policy plus competent research can eliminate the need for any more value judgments in criterion development.

This continues the fallacy of the single criterion by overlooking the second type of judgment, the designation of certain behaviors or results (criterion elements) as more or less valuable than others. It is this judgment which is most easily improved by the very simple and convenient expedient of postponing it as long as possible.

The sequence of events suggested here as typical of the present state of affairs places this judgment quite early in the personnel research process. This judgment is usually made prior to any research activity save that which may be associated with job analysis. The reliability of this judgment can be improved, however, by postponing it until validation data are in and until current needs of the organization, *at the time a prediction must be made,* are known.

This proposal can be made more explicit by suggesting a new sequence of events in criterion development and subsequent personnel research:

1. Analyze the job and/or the organizational needs by new, yet-to-be-developed techniques.
2. Develop measures of actual behavior relative to the behavior expected, as identified in job and need analysis. These measures are to supplement measures of the consequences of work—the so-called objective criteria commonly tried at present.
3. Identify the criterion dimensions underlying such measures by factor analysis or cluster analysis or pattern analysis.
4. Develop reliable measures, each with high construct validity, of the elements so identified.
5. For each independent variable (predictor), determine its predictive validity for *each one* of the foregoing criterion measures, taking them one at a time.

The first kind of judgment—that a given behavior or its result has some degree of value—is still implied in step 2. Any judgment of the relative importance of those considered to *be* important does not appear in this sequence of research events. This judgment would not be made, in fact, until administrative use is to be made of the research results. If we are concerned with selection research, for example, the judgment would be

postponed until the time an employment decision must be made. The employment manager could, for each applicant, make a series of predictions about the kind of behavior to be expected or about the organizational consequences of hiring the applicant. It is likely that, for any given applicant, some predictions would be favorable and others less so. Other applicants might show different patterns, being predicted to be more successful where a first applicant seems risky. Only now, in this proposed sequence, is the judgment of the relative importance of the things to be predicted actually made. At this point, that judgment has the benefit of knowing the relative validities of the various predictions that are possible and the further benefit of knowing the immediate situational needs of the organization.

Conclusion

Improvement in personnel research of all kinds—including selection and placement but not these exclusively—will not be dramatic until the criterion problem is solved. This note has made no real, empirical progress in reaching that solution, but it has attempted to point out a serious obstacle and the path for avoiding it.

The basic argument of this paper is that (*a*) there are in many personnel situations dimensions of job performance and of performance consequences that are quite independent of each other, and that (*b*) the relative importance of these independent criteria ought not be judged prior to validation research—as is so commonly done in the development of "composite" criteria—but ought to instead be judged *after* the empirical data are in, at the time these data are to be used. The suggestion is that this will result in clearer criterion definition, more reliable criterion measurement, and greatly improved criterion prediction.

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4. Selecting Supervisors with Peer Ratings *

Joseph Weitz

One problem constantly facing industry is the selection of supervisory personnel. This has been true for two reasons. One is the development of selection tests or procedures which are valid and secondly, perhaps even more important, is the determination of appropriate criteria for the evaluation of successful or unsuccessful supervisors. Usually the criteria consist of some kind of rating since in many instances production criteria are not meaningful.

The test procedures have ranged all the way from very short "personality" paper and pencil devices to a thorough clinical diagnosis. Frequently, a stereotype is set up of what good supervisory or managerial personnel should be with no relation to reality. Then the candidate is interviewed, Rorschached, Thematicappercepted, and generally analyzed until the selector comes out with a personality description of the candidate. Sometimes the selector even says whether or not this candidate would make a good supervisor. Very frequently, however, the paper picture is presented and top management is left to make up its own mind whether or not they want this kind of man. Now, there is some question as to whether this paper picture itself is accurate and a further question as to whether the description is pertinent to the job that is to be done.

If any testing is done, it is rare indeed to have people selected without regard to the test results, put in a managerial position, subsequently rated in some way on their performance, and then their test results related to

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the performance ratings. While ratings are by no means perfect and we know considerable about their unreliability at the present time, this is one of the few criteria that is available to workers in this area. They do have the value of meaningfulness to top management.

The purpose of this study was to investigate the use of peer nominations (buddy ratings) in predicting supervisory competence.

Procedure. This study developed from two different angles. One developed from the question as to whether or not there are identifiable characteristics of good and poor supervisory personnel which are recognizable to subordinates, and secondly can these characteristics be recognized in peers so that in effect they can identify potentially good supervisors. These then are the hypotheses to be tested in this study: (1) Good supervisors have certain identifiable characteristics which differentiate them from poor supervisors, and (2) these characteristics can be identified in potential supervisors by peers at the time they are all in the subordinate capacity.

Mann and Dent (3) have shown that subordinates can identify certain characteristics in their supervisors which differentiate those who are considered promotable from those who are considered unsatisfactory by top management. Some of the items which seemed pertinent were judgments concerning whether or not the supervisor was "good at handling people," "were the workers free to discuss job problems with the supervisor," whether the "supervisor will go to bat when an employee has a complaint," whether the "supervisor uses good supervision," etc. The judgments by the subordinates on these characteristics and others showed differences when related to the criterion of promotability. This then would argue in favor of hypothesis one, that there are characteristics which differentiate good and poor supervisors. Further, it would appear that these characteristics can be identified by subordinates.

Hollander (2) showed in a review article that buddy ratings (peer nominations) were useful in predicting certain performance criteria in the military situation and further showed in another article (1) that the validity of peer nomination scores is not adversely affected by questions of friendship. Completing the questionnaire under what he calls an administrative set (that is, playing for keeps) rather than a "research set" does not appear to affect the validity of peer nominations. With this information it was thought feasible to use buddy ratings as a selection device for supervisory personnel.

The present study was conducted in one life insurance company. This company is made up of 127 districts with a total of approximately 2,200 agents. In each district, there is a district manager and several assistant managers. Each assistant manager has from two to six men under him whom he supervises (median = 4). The task here was to select new assistant managers for replacement and expansion.

The study was started in January, 1956. The district manager in each district administered a fourteen-item questionnaire to each of his agents. The manager was aware of the purpose of the study; the agents were told it was to study the development of agents and how they operate as a team. The questionnaire is shown in Appendix 1. It can be seen from the questionnaire that two kinds of items were used—those which were work-oriented and those which were socially-oriented. Some of the items used were similar to those described by Mann and Dent. Each man was to complete the questionnaire anonymously and send it in a self-addressed return envelope to the Research Division of the Life Insurance Agency Management Association. Cooperation was very good and from only two districts did we not receive any questionnaires. It is true that all agents did not complete all of the questions but a vast majority of them had at least one nomination for each item.[1]

After the questionnaires were returned, a tally was made of the first, second, and third place choices received by each man in the district for each item. A simple scoring system was used; that is, three points for a first place, two points for a second place, and one point for a third place. The total number of points for each man was computed for each item and these totals were added for the district. Each man's total number of points on each item was then divided by the district total to give the proportion of the total vote he received on that item. This was necessary since there were a different number of votes in each district. Using this percentage score, the men were then ranked in terms of the district vote which he received on each item.

Arrangements were made with the company to report to us any promotions made to assistant manager. These promotions were made without knowledge of the peer nominations. Six months after a man was promoted, we asked the home office regional supervisors (that is, top management people who visit the districts and have very close contact with the district operation) to complete a rating scale on each man promoted. The form is shown in Appendix 2. From the testing data in January through September, 1956, 100 men had been promoted and had been rated six months after promotion. This brought us through to March, 1957.

It will be recalled that the proportion of votes each man received in the district on each item was ranked within the district. For a final score

[1] In future work, we plan to request three nominations for each item and not give the alternative of nominating one or two. The instructions should also be modified for this kind of work group in another way. Instead of saying exclude *your assistant manager,* they should exclude *assistant managers.* The author overlooked the possibility that some agents might choose an assistant manager other than their own in answering a question. Unfortunately, a few of the agents did just this and these votes had to be eliminated.

on these men who were promoted, we counted the number of items on which they were either first, second, or third in rank in the district in terms of the proportion of votes they received. In other words, if a man received the most, second most or third most votes, for example, on eight of the fourteen items, he would receive a score of eight. If a man was not in the top three ranks on any items, he would receive a score of zero. Thus, scores could range from zero to fourteen.

Results. The score for each man was related to the rating given him by the regional supervisor; that is, excellent, good, fair, or poor. Anyone who was returned to the job of an agent or left the company was combined with those who were rated poor.

The 100 cases were split into approximate thirds. This gave groupings of scores zero to three, four to nine, and ten to fourteen. The per cent rated good or excellent for each of these score groups is shown in Table 1.

Table 1. Ratings for Each of Three Thirds
($N = 100$)

Score	N	Per Cent Good or Excellent
10–14	33	76
4–9	28	54
0–3	39	39

This gives a chi square of 10.08 which is beyond the .01 level of significance. Using all the scores without grouping, a biserial correlation was computed splitting the group of good and excellent vs. poor and fair ratings. The r_{bis} is .40 (significant beyond the .01 level). Since there is a possibility that all of the assumptions of the r_{bis} are not met, the data were tested with the Kolmogorov test (4). The data were significant beyond the .01 level.

It should be remembered that the home office regional supervisors who made the ratings never saw the peer nominations. Consequently, it would appear that these nominations are useful in predicting the ratings for assistant manager. If this criterion of success on the job is acceptable and certainly it must have some meaningfulness to be this predictable, the buddy ratings would seem to be a valid procedure for selecting this type of supervisory personnel.

In order to see whether or not item weighting would add to the predictiveness of the score, the sample was split in half. The relationship between each item and the criteria was computed on the first half. Each of the items in this half was predictive of the criterion in the expected direction and there were no wide discrepancies in item discrimination. On the hold-out sample, strangely enough, each of the items actually

showed greater discrimination. Again, there was very little difference between the differential prediction between the items. Consequently, it was felt that unit weighting was just about as good as any more elaborate weighting system.

We were interested in the intercorrelations of all items. They ranged from .47 to .96. For these correlations, a random sample ($N = 317$) of all agents was used (not those just promoted). The highest correlation was between Item 1 and Item 2. We thought we were getting at two different aspects of the job but obviously we were not. As would be expected, the socially-oriented items were clustered, and the work-oriented items clustered. The lowest correlations between Items 9 and 4 (who is the best all-around agent, and who do you prefer to be with socially), Items 13 and 14 (who is best at programming, and who do you prefer to be with socially), Items 13 and 5 (who is best at programming, and who is most likely to cheer you up if you feel low), Items 3 and 5 (who would you prefer to have help you on your accounts and records, and who is most likely to cheer you up if you feel low). All of these correlated below .50.

Undoubtedly, the test could be cut down in length or perhaps improved by the addition of other items. There is unquestionably some halo as indicated by the correlations, yet each of the items seem to be predictive and the battery of items is significantly predictive.

Discussion. One might raise the question of whether or not the managers and assistant managers could do just as good a job of forecasting who the agents would pick for each of the items. If this were true, why bother asking the agents? On a questionnaire administered at the same time as the agents' questionnaire, we asked the assistant managers to predict who the agents would pick first, second and third on each of the items, and although no formal analysis was made it was found that this was a highly variable art. Some of the assistant managers could guess fairly accurately whereas others missed the boat completely. This analysis itself might lead to some fruitful hypothesis concerning excellence of supervision. How do good and poor supervisors differ with respect to knowing who their agents will choose?

The question of whether or not supervisory personnel could do just as well in selecting assistant managers as their peer ratings is not answered. Since 45% of those promoted were subsequently rated poor or fair or were demoted, it would militate against this supposition. The supervisory personnel in a district are consulted in any promotion and, in fact, their recommendations are given very heavy weight in the final decision. Why then should 45% of the agents wind up being "poor" or "fair" if the persons responsible for making promotions could do as well or better than the peer nominations?

While this study answers some questions, it raises a number. No ac-

count was taken of length of service of the agent doing the choosing. Equal weight was given to the choices of new men as well as those on the job and in the district for a longer period of time. Had this factor been controlled, would it have changed the predictions? Further, if every agent had made three choices would this have improved the predictions? The analysis would certainly have been easier.

Another question which is unanswered in this study is how valuable is this procedure for predicting success or failure of assistant managers promoted to districts outside of the district in which the peer nominations occurred. There were some cases included in these data, but not a sufficiently large enough group to treat separately.

The question also arises as to what will happen when this company uses this technique for selection purposes. Due to the turnover of agents, if this technique were to be used for selection purposes, the peer nomination questionnaire would have to be administered about once every year. (We are already getting promotions of people who were not in the district when the questionnaire was administered.) If the agents knew that this questionnaire was for "keeps" and would have an effect on the promotions of their fellow agents, would this affect the validity of the procedure? Judging from Hollander's (2) study it would not. In view of the fact that the last item on the questionnaire asked, "Which agents would make the best assistant manager?" and these agents are not naïve, it could be argued that they have some idea of the purpose of the present questionnaire. This also would lead one to believe that if the technique were used for promotional purposes it would lose its validity. It may be of interest to know that this company is planning to use this procedure in selecting its assistant managers. It should be pointed out, however, that their evaluations will be made and that selections will not be made on peer ratings. The author believes that these ratings should be used as additional information in the selection of supervisory personnel and not as a panacea.

If we can generalize from this study, there is no reason to believe that this technique could not be used at other levels and in other work situations. Of course, the question would have to be modified and the procedure tested to see if it were fruitful.

It would seem that both hypotheses are supported—that is: (1) There are certain identifiable characteristics which differentiate good and poor supervisory personnel, and (2) these characteristics can be identified in potential supervisors by peers at the time they are all in the subordinate position.

Appendix 1

For each question, please rank the top three agents in your office on the following items; exclude yourself, your assistant manager, your manager and

clerical force. If, in your opinion, there are not as many as three people who fulfill the requirements of a particular question, name only the top two or top one. However, wherever possible please rank the top three.

1. Who would you prefer to go to for help on a tough case?
   1st _____
   2nd _____
   3rd _____
2. Who would you prefer to have accompany you on a tough case?
   1st _____
   2nd _____
   3rd _____
3. If you needed help on your accounts and records, who would you prefer to have help you?
   1st _____
   2nd _____
   3rd _____
4. Who do you prefer to be with socially?
   1st _____
   2nd _____
   3rd _____
5. Who is most likely to cheer you up if you feel low?
   1st _____
   2nd _____
   3rd _____
6. Who is usually pulling most for both the district and the agents?
   1st _____
   2nd _____
   3rd _____
7. Who gets along best with his assistant manager?
   1st _____
   2nd _____
   3rd _____
8. Who gets along best with the manager?
   1st _____
   2nd _____
   3rd _____
9. Who is the best all-around agent in the office?
   1st _____
   2nd _____
   3rd _____
10. If you were going to be away for a week or two, which agent would you want to take over your debit?
    1st _____
    2nd _____
    3rd _____

11. With which agents in the office do you feel free to discuss your personal problems?
    1st _____
    2nd _____
    3rd _____
12. Which agents in the office are best at handling people?
    1st _____
    2nd _____
    3rd _____
13. Which agents are best at programming?
    1st _____
    2nd _____
    3rd _____
14. Which agents would make the best assistant manager?
    1st _____
    2nd _____
    3rd _____

Appendix 2

1. I believe that Assistant Manager _____ in District _____ is performing his duties (check one)
   Much better than I expected _____
   Better than I expected _____
   As well as I expected _____
   Not as well as I expected _____
   Much poorer than I expected _____
2. As Assistant Manager (check one)
   He is doing an excellent job _____
   He is doing a good job _____
   He is doing a fair job _____
   He is doing a poor job _____
   Rater's name _____

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5. Personnel Selection and Classification Research as a Laboratory Science *

R. M. W. Travers

The use of tests for the prediction of success in instructional programs such as are conducted by schools, colleges, and the armed forces, has been until recently an enterprise based on empirically established relationships between test scores and either measures of school achievement or measures of job proficiency. Such constructs as it has employed have been of a low order and have been mainly of a response-inferred type, but lack of a theoretical basis for what has been done seems to have been of no real disadvantage, for much of substantial value has been achieved. In terms of practical results it has been a successful endeavor; but in terms of its contribution to an organized body of knowledge of behavior it has contributed little, and, indeed, nearly every postulate and principle which it has evolved pertains not to behavior but to the characteristics of measuring instruments. This statement should not be taken to belittle the contribution which has been made to the technology of test construction and theory of measurement, nor the immense benefits which society has reaped from the empirical knowledge which has been gained, for these are well known and well recognized. But it must be admitted that in spite of these successes, research in the field of personnel selection and classification has not resulted in the development of a series of *principles of behavior* which can be used to solve new problems. Indeed, it is practice to "validate" tests for each new situation that arises on the assumption that useful principles have not been discovered which permit the prediction of "validity" coefficients. Our purpose here is to examine approaches which may produce the kinds of generalization which are needed if the knowledge acquired is to have the structure of a science.

Progress by Building and Validating New Tests. In areas of learning in which tests have been used with some success for predicting achievement, the customary procedure for discovering better predictors is that of first developing new instruments or new assemblies of items, and then determining which instruments or new assemblies of items, if any, can be used to produce more accurate predictions. This procedure is based on

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the assumption that (*a*) inadequacies in the prediction process are a result of inadequacies of the test currently available, and (*b*) improvement will come when the psychologist happens to develop the right test. Since doubts felt by the present writer about the utility of this procedure do not seem to be shared by the majority of his colleagues, it was decided to examine some data to check its usefulness in an area where there has been a long history of attempts to improve prediction by building new tests. An excellent opportunity to do this is provided in the case of tests used for predicting achievement in college. Studies pertaining to the prediction of college achievement have been summarized by Garrett (1) who has conveniently tabulated for each year the correlations found between measures of college achievement and scores derived from tests of college aptitude and general intelligence. When the median correlation for each year was plotted against time the graph shown in Figure 1 resulted. This graph is based on 122 coefficients of correlation grouped by year of publication, with the exception that at the ends of the time period it was considered desirable to group together coefficients derived from more than one year.

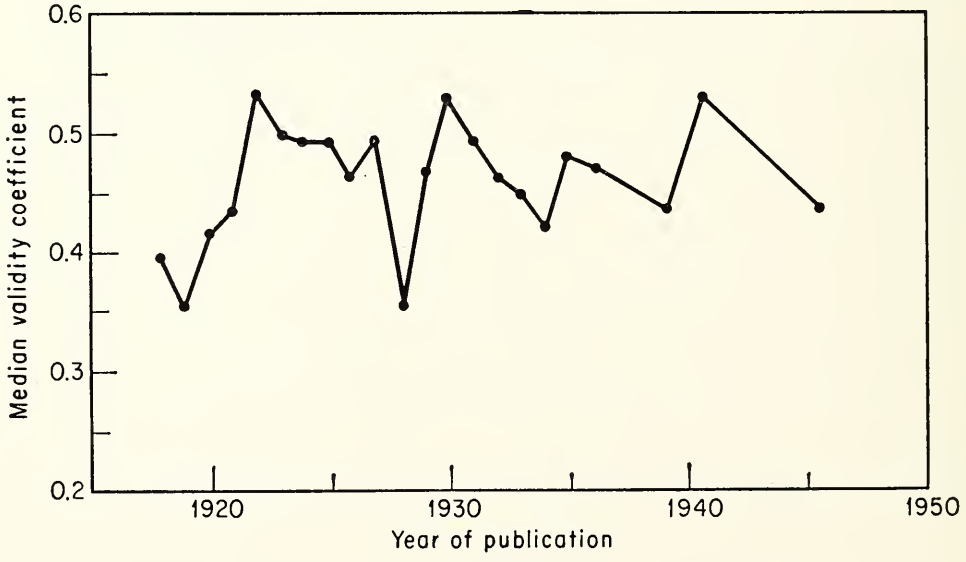

FIG. 1. The relationship between year of publication and the median correlation between scores on tests and general college aptitude and college grades. Data from Garrett (1).

The impression created by this graph is that despite all the effort and thought that has been channelled into the construction of new tests for predicting college success, and despite the massive collection of data that has been undertaken by numerous investigators, accuracy of predictions from tests of scholastic aptitude does not seem to have shown any marked improvement over a thirty-year period. The apparent lack of improvement does not seem to be due to any selection on the part of journal

editions of articles pertaining to highly novel instruments based on little research, for the coefficients reported tend to be derived from the well-established instruments which are based on a firm foundation of research. If any period of improvement can be discovered at all, in this graph, it is in the very early years of test development, but this period was short in duration. Of course, it is not claimed that the data presented in this graph can be interpreted completely unequivocally, for they are a product of many conditions, but the writer would certainly expect that if there had been any marked trend in improvement it would have shown itself.

No comfort can be derived from the argument that progress in predicting college achievement has been made not in the intellectual domain but in the domain of personality variables, for Garrett has also conveniently summarized the results of studies of predicting success with "personality" variables other than interests. The coefficients representing the latter results show a depressing and unimpressive fluctuation about zero. The search for new variables seems to have been hardly more promising than attempts to improve old ones.

Most other fields of prediction of achievement do not provide the volume of studies manifested by that which has just been considered, and, therefore, trends in accuracy of prediction do not lend themselves so well to graphical representation. However, the writer has the impression that the typical pattern is that, after the first few attempts have been made to develop tests for predicting achievement in a particular program, a ceiling on accuracy of prediction is rapidly reached. The area of mechanical learning is typical in this respect, for during the past fifteen years the proliferation of tests of mechanical aptitude has done little to improve the accuracy with which achievement in mechanical learning situations can be predicted, and it is doubtful whether new tests, which undoubtedly will be produced in the next few years, will contribute further to accuracy of prediction—at least, not if they are developed on the basis of procedures which have been typical in the past.

This does not imply that predictions of achievement today cannot be made in a greater number of areas of learning than was formerly possible, for psychologists are constantly adding to the list of types of training programs in which some success can be attained in the prediction of achievement. Difficulty does not arise in extending this list but in improving predictions in those areas in which some success has already been achieved. In a well-established area of prediction the probability p that the next test will be an improvement over the last is almost negligible if p is computed on the basis of past experience.

To the test technologist the situation may appear to be one of despair for the evidence would indicate that the limit of progress has been reached. To the scientist the situation raises the problem of what is limiting the accuracy of prediction. The scientist will, we hope, avoid

the temptation of ascribing the unaccounted-for variance in the dependent variable to some mysterious construct called motivation, a practice which has been common in the past. In contrast he should seek to develop a model which will give direction to the search for variables still to be identified, and attempt to develop a research methodology which can be used for testing the utility of various aspects of the model. It is this matter which must now be discussed.

The Direction of Current Attempts to Improve Predictions. There seems to be considerable agreement that a central source of difficulty in the improvement of predictions stems from inadequacies of the dependent variable; this point is reiterated in article after article. With this in mind research workers have devoted their energies to the exploration of improved methods of measuring success in organized learning programs. One approach has been to develop new rating methods; another has been to substitute objective measurement for the judgment processes which rating involves. The first of these approaches has been directed towards the goal of developing rating devices which provide scores contaminated to a lesser degree with irrelevant variables than scores from previous instruments. One of the more ingenious innovations of this has been the forced-choice type of assessment procedure, but after some years of experimentation with this and other modified rating procedures the indisputable and discouraging conclusion seems to have been reached that variations in the form of rating procedures have negligible effect compared with variations in rater characteristics. This is not altogether surprising if rating procedures are viewed as representing the response of rater x to the response of ratee y to situation z. There is no reason for believing that the intervening variables which are partial determinants of the rater's response should be any less important than the intervening variables which are characteristics of the ratee and which are partial determinants of his response to situation z. The present trend towards the study of rater characteristics seems to offer more promise than attempts to improve the form of rating scales, but there is a long road ahead before new methods of ratings are likely to yield variables which have properties superior to those which have been in use for many years.

The use of objective measures of proficiency as dependent variables has considerable advantages over the use of ratings. The former may measure with directness the response variables to be predicted, and they eliminate rater characteristics as a source of unwanted variance and appear to solve many of the perplexing difficulties which are collectively referred to as the criterion problem. However, they also present special problems of their own.

In academic programs objective tests have sometimes been used as criteria of success, but at least a part of the correlation between tests of scholastic aptitude and tests of achievement must be attributable to an

ability to answer multiple-choice questions. Similarity in format of the measuring instruments through which the independent and dependent variables are measured may generate a correlation. In technical training programs designed to develop work skills rather than to achieve the goals of a general education the use of objective measures of the proficiencies developed becomes a matter fraught with practical difficulties. These difficulties have been well discussed in articles on the construction of performance tests and need not be considered here further except to point out that in military training programs they are often accentuated by the complexity and high cost of the equipment involved and the impracticality of obtaining the release of such high cost and high priority equipment for the purpose of setting up standardized testing situations.

Further Approaches to be Explored. Methods of improving the properties of the dependent variable as it is measured *in situ* are commonly discussed as if they were the only means of improving predictions, but they should be viewed as representing only one of several possible approaches to the problem. We are, at present, only in the exploratory stages of developing methodologies which can be satisfactorily applied to the solution of prediction problems in training and selection. Of potential value is a laboratory approach to these problems. The possibilities and difficulties presented by laboratory investigation in this area need to be considered.

The purposes and procedures of the experimental approach to problems of personnel selection and classification are similar to those of other applications of experimental science. The general approach involves the study of the prediction of limited aspects of the total behavior it is desired to predict, and these aspects are studied under laboratory conditions. The purpose of such studies is to identify the determinants of the particular class of responses that it is desired to predict. The discussion of an example of this method will perhaps serve to illustrate its potentialities and also its shortcomings.

A problem of central interest to the Air Force is that of selecting personnel who can be trained to become effective problem solvers in the maintenance of complex electronic and mechanical equipment. In the laboratory approach the first step in the study of such a problem is the development of hypotheses concerning the determinants of the behavior that it is desired to predict. Although cues useful for deriving such hypotheses must be derived from observations of performance of the job, conferences with supervisors and instructors, and previous correlational studies, it is essential that they be formulated within a framework of current psychological theory. Hypotheses should be stated in terms of functional relationships and not in terms of such response-inferred constructs as "factors" which account for a specific fraction of the variance of the dependent variable. Practical necessity usually dictates that the hy-

potheses developed cover only limited aspects of the phenomena under investigation.

In order to illustrate the kinds of hypotheses revelant to personnel selection and classification research which may be studied in the laboratory, it is appropriate to discuss a study related to the selection of equipment maintenance men. Information initially obtained covering the tasks performed by maintenance men revealed a vast range of problem-solving activities. A first essential step seemed to be that of classifying together stimulus situations which result in common determinants of responses to those situations. Unfortunately, no useful classification of problems has yet been accomplished, and yet the wide range of phenomena which are studied in problem-solving research makes such a classification essential. Discussion with instructors in certain electronic schools which teach trouble-shooting suggested that while most problems presented by equipment malfunction can be solved by following a systematic routine, some of the more difficult ones, because they present unusual combinations of circumstances, do not yield to such a simple approach. The solution of such unusual problems often requires the mechanic to look beyond the familiar symptoms-malfunction relationships and search for the unfamiliar and unexpected. Thus in trouble-shooting there appears to be, on the one hand, the type of problem which yields to the systematic and plodding trouble-shooter, and, on the other, the odd problem in which relationships between symptom and malfunction are different or in opposition to those which have been previously learned. Thomas and French [1] decided, therefore, to set up an experiment to determine whether problem-solving situations have determinants which are different and distinct. A number of mechanical and electrical problems of the two types under consideration were built and administered to subjects who had also taken a battery of tests designed to provide differential predictions of success in these two tasks. The findings are of considerable interest in that they are consistent with the hypothesis. The ability to solve the type of problem which yielded to the methodical trouble-shooting procedure seemed to be predicted well with typical tests of mechanical aptitude, but the ability to solve the type of problem which required a reversal of previously acquired relationships was related to tests of rigidity and, to a negligible extent, to tests of mechanical aptitude and general ability. The data suggest that certain types of high level trouble-shooting can be best undertaken by individuals who have certain "personality" characteristics in addition to their technical skills. It should be noted that the Thomas and French study could hardly have been undertaken in the field.

In this brief description, it is not possible to describe the detailed nature of the design of this experimental study which became complicated

[1] Thomas, Frank H., and French, Elizabeth G., Personal communication, August, 1954.

because of the phenomenon of transfer of training from performance on one problem to performance on another. The brief description serves only to illustrate the type of selection problem that can be investigated within the laboratory, and how a problem which it may not be possible to study under field conditions may become investigable when personnel selection is viewed as a laboratory science. However, at this time we are only in the stage of exploring potentialities of the approach and it may help others similarly engaged to outline some of the difficulties which this approach presents.

First, there is a fundamental difficulty which is now being explored, and which is best illustrated by the further discussion of the research project of Thomas and French which has already been described. In the mechanical and electrical problems used in their research every effort was made to design the problems in such a way that all the information necessary for solving them was available to every subject. In this way it was hoped that mechanical and electrical problem solving under conditions of equal knowledge about the problem could be studied. However, this procedure fails to take into account the fact that trained men who are servicing mechanical or electrical assemblies are solving problems through the application of a limited number of principles, learned in training, to highly familiar equipment. Therefore, the conditions of the Thomas and French study of problem solving may differ in essential aspects from those in which generalization is desired. Bottenberg,[2] who first raised this question, has developed a technique for studying problem solving under various conditions of training with the equipment, and is studying whether the determinants of problem-solving behavior change as the subject acquires through training a repertoire of principles which he can apply.

Relevant to this problem is a recent article by Ferguson (2) which points out that the reasonably stable abilities which Thurstone has sought to establish refer to performance at a crude limit of learning. They represent a subject's ability to perform a particular operation after extensive learning has brought it to the point where further practice is unlikely to produce improvement. Ferguson further suggests that the abilities which measure crude limits of learning exert transfer effects, both positive and negative, on future learning. It is reasonable to expect, on the basis of Ferguson's theory of prediction, that optimum levels of prediction will be achieved when the dependent and independent variables represent crude limits of learning.

The difficulties introduced by the possibility that dependent variables developed in the laboratory should represent crude limits of learning may present a major stumbling block in the development of the laboratory approach. It is conceivable that on this account the salient effects of pro-

[2] Bottenberg, Robert A., Personal communication, January, 1954.

longed distributed training, such as occurs in technical training in the Air Force, cannot be studied easily on a miniature scale. Prolonged distributed training may have important effects which are different from those of the relatively brief and concentrated training of the type that can be given in the laboratory.

There is a second difficulty which time will remedy. It is the absence of any well-developed techniques and experimental methods which can be applied directly to the study of problems in the area. Well-developed areas of experimentation are usually equipped with techniques which can be applied to the study of a great range of psychological problems. For example, the development of the Skinner box provided a technique through which a whole range of learning problems could be studied. The type of human learning research which Ebbinghaus initiated could not have made the rapid advances which it did make without the development of word lists and associations methods. Well-developed techniques provide not only dependent variables which have desirable metrical properties but also the means whereby relevant conditions can be manipulated and controlled. In the study of classification and selection problems by means of a laboratory approach, we are still at the stage of developing techniques whereby a great variety of problems can be investigated, but only in the area of mechanical problem solving are we near to the development of a satisfactory technique which will permit the conduct of programs of related experiments.

Third, there is the difficulty encountered in most experimental work with human subjects—that of exercising control over motivational variables. While deprivation methods offer little opportunity for use, the introduction of rewards and threats offers the most obvious method of exercising control. In the case of Officer Candidate School trainees there is some evidence that, under conditions at present prevailing, a mild threat such as is implied in the statement, "The results of this test are important to your future," does raise the level of achievement motivation. However, with new recruits the results of such threats or the offering of minor rewards, such as a letter of commendation for outstanding performance, produces highly variable results. During certain periods, the introduction of such conditions has been associated with marked changes in achievement, while at other times no such changes could be observed. This inconsistency seems to be a result of uncontrolled antecedent condition. Statements made by NCOs concerning the purposes of psychological testing administered by the center appear to be more powerful in their influence than any made by the test administrator, although it appears that there have been times when NCOs have avoided providing such orientation.

There is some hope that the difficulties discussed here may soon be at least partially overcome, for French (3), in his laboratory, has developed

an instrument which appears to be extremely sensitive to changes in achievement need produced by verbal directions. This instrument, constructed along theoretical lines similar to that which McClelland and his associates have developed, can be used in experimental studies of achievement motivation in much the same way as the chemist uses a chemical indicator to signify changes in acidity-alkalinity.

Fourth, there is a difficulty which is one shared with other laboratory sciences. It is the difficulty involved in the choice of laboratory analogues or paradigms of the natural phenomenon that it is desired to study. It has become customary to refer to laboratory *paradigms* rather than to laboratory *analogues,* but the term *paradigm* implies that the experimenter is dealing with an *example of* or *model of* the naturally occurring phenomenon to be investigated. This may not be the case at all, for the laboratory phenomenon may at times bear only a rather remote similarity to the natural phenomenon to be investigated, and the similarity may reside only in some rather abstract relationship.

It must be admitted that the difficulty of developing sound analogues may be greater in psychology than in the physical sciences. For example, when Newton realized that the direct study of falling bodies involved what appeared to be insuperable difficulties because of the high speed of descent, he introduced the notion that the same phenomenon could be investigated through the use of bodies moving relatively slowly down an inclined plane. The analogue laboratory situation of the inclined plane could be fully justified within Newton's deductive system. However, the laboratory analogues which the psychologist uses cannot be justified within a rigorous deductive system. They depend to a substantial extent on judgments that the laboratory situation and the larger situation which it represents in a simplified form are similar.

The point which is being raised here is that a laboratory approach to problems of personnel selection and classification requires the use of a psychological model. This model forms an essential basis for selecting laboratory analogues of natural phenomena, a basis for generating the hypotheses that are tested through subsequent laboratory experiments, and a framework for guiding the process of generalization. It is obvious that a useful model cannot be derived from a vacuum, but must be based on reproducible data. One cannot expect the model to be consistent with all of the data, but it must be consistent with at least a substantial part of it. There is certainly no lack of data on which to build a model in the field of personnel selection and classification and, indeed, difficulties are presented by an embarrassing overabundance of data rather than by a lack.

Since the term *model* has acquired multiplicity of meanings in recent years, it is necessary to state that it is used here to refer to a description (qualitative or quantitative) of a functional relation among events. This

meaning is in contrast to that used by most, but not all, of those concerned with building mathematical *models,* who use the term in an entirely different sense. In the latter case, the concept of building models refers to the development of rules for categorizing, arranging, and quantifying events to satisfy some condition of parsimony laid down by the model builder. It is unfortunate that these two types of model building should be confused by the accident of possessing a common name. The need for model building which is discussed here refers to the building of the first type of model and not to the building of mathematical models which serve an entirely different purpose. In the program of research discussed, mathematical models would have their uses at a much later stage, when the results were to be applied to the immediate solution of practical problems and the need of reducing the number of instruments involved would arise.

While model building is a flourishing enterprise in psychology at the present time, it has had little impact on applied psychology and no adequate basis exists for deciding that one type of model will be more productive than another. One presumes, however, that enough has been learned in recent years about model building for the personnel psychologist to avoid the futility of using models which require response-inferred constructs, but beyond this point the choice is up to him. Our own preferences have been for the development of a psychological model which includes intervening variables as well as stimulus and response variables. It may be pointed out that personnel research has not, as far as the present writer is acquainted, introduced stimulus variables, and has not needed them because the types of generalization sought have been of a *R-R* type, rather than a *S-R* type. The advantages to be accrued from introducing stimulus variables into personnel psychology seem immense. The model which has been developed as a basis for much of the research program discussed here has been published in a tentative form (4), but knowledge thus far accumulated has already rendered much of this model obsolete.

Summary

The purpose of this paper has been to present evidence of the difficulties which personnel research encounters in improving accuracy of prediction in areas which have been well worked over by traditional methods, and to suggest methods of overcoming those difficulties. The ceiling on the accuracy of prediction which can be achieved seems to be rapidly reached after a few studies have been undertaken, and the difficulties of making more accurate predictions are substantial. The major current attempt to resolve these difficulties is through efforts to improve the metrical properties of the dependent variable. It has been the main

purpose of this article to point out that the latter attack on the difficulties of improving predictions is not the only one which can be considered, for a laboratory approach offers many unexplored avenues. The latter approach was discussed in relation to a research program which, although still in the earliest stages of development, provides some illustrations of what can and what cannot be done.

A major advantage of a laboratory approach lies in the fact that it permits the study of many problems of selection and classification which otherwise would be virtually uninvestigable. It also permits, through experimentation, the systematic development of a body of knowledge concerning the determinants of behavior in particular job situations. However, the laboratory approach encounters certain difficulties in its development which can be at least partially circumvented by the development of adequate techniques.

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Part Four: TRAINING

1. Some Needs in Training Research *

Harold A. Edgerton

The world is full of training and yet there has been little research on training! Have we missed the boat? Is the topic of little import? Could it possibly be none of our business?

My answers, respectively and very briefly, are: don't know, important, and our business.

The purpose in bringing up the subject at this time is to stir up greater interest and activity in a field where there is much to be done.

Training research does not appear to have "schools" of thought in the same sense that we may classify "schools" of learning theory. One may be permitted, however, to identify "schools" as far as training practices are concerned. Our identification brings to light such schools as the following: (The list is not complete.)

a. Chart and flannel board school—charts, plain, simple, complex or gaudy —MOTTO: "No training can penetrate deeper than the retina without an impenetrable chart."

b. Group interactance school—All training is proportional to the mean of time and intensity of reaction of one person to other members of a group.

c. Training aids and gadgets—Those are the people who are trying to get the message across that cutaways, simulators, mock ups, and the like, are the high speed vehicles for training. "If you can't see it, how can you learn it?"

d. The round table-workshop school of training. A get together and pool ideas system. The "man in motion" school.

e. In some instances, the *Case Method* holds the center of the stage. This seems to be the property of medical, legal, executive, and clinical psychologist training. "If you can't case it, you can't take it with you."

f. The role playing school—requires that we try to show how someone else might act when their shoes pinch our corns.

g. The motivation school—would hold that basically the problem of training is to get the learner to really want to learn.

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These are only a sample—nonrandom—of apparent schools of thought. They become identified to me as schools, because some of their more devoted proponents talk and act as if the particular method, gadget or technique represented the one and true doctrine of training.

I suspect that each has some merit. We have opinion and judgment as to when each might be appropriate. The answer may be as direct as that presented by a study, made some years ago in the Extension Division, Department of Agriculture, regarding approaches to getting ideas across. A number of methods or approaches were used. Each, of course, was selected because it was practical and was believed to have merit. It was found that each approach (e.g., meetings, house calls, etc.) would yield positive and worthwhile results. Two used in combination were better than one, etc., up to combinations of five. After that, there was very little improvement with the employment of additional approaches.

What would be produced by a research designed so that such approaches would be aggregated say by the Wherry-Doolittle method? It would be of value to study our schools of training to find answers to such questions.

To what extent is one method more effective in training one kind of people rather than another, or for one purpose or goal rather than some other, or for one kind of subject matter rather than another? Training men, as well as psychologists, have developed opinions on these matters and conduct their training in accord with those judgments. There has not been much research to support one opinion or judgment in preference to another. The educational psychologists have done, perhaps, the most research in such areas as training or teaching methods. But they have not done enough!

Frequently I've asked colleagues, "What real ideas has training research produced during the past five years?" Here they are:

a. Penn State's—"Watch and Do" training films—shooting baskets.

b. Fryer—study of the acquisition of "Attitude-Knowledge-Skill patterns" —particularly in the area of flight skills.

c. Special Devices Center efforts to determine when and what training devices are needed.

d. Work of the Air Force in the area of Team Training.

e. Greater awareness of the problems of evaluation of training.

Along with these answers, I heard many reasons why training research is so scarce. What are the "stone walls" against which we batter our heads?

a. It may lie in the kinds of personnel who control and direct training. Are these persons characteristically those who know how to do the job for which training is being given, and are content to see training operate in much the same way in which they were trained?

b. Are some of the stones the inflexibility of persons who have learned some rules regarding education?

c. Perhaps another, with the benefit of interaction from the just mentioned classes, is "administrative feasibility." Carrying on any adequate training research in an on-going training program is a high grade nuisance to an administrator. Perhaps we need better communication in this area.

Have you ever wondered how the over-all variance of on-the-job performance would be apportioned, if it could be allocated to four sources? What per cent would be chargeable to selection, how much to training, how much to the man-machine or operating situation? And, finally, how much would be accounted for by other factors including ubiquitous error?

Not all training research should be centered on the trainees. For example, much has been learned about training devices and their desirable and undesirable characteristics. However, no one, as far as I know, has tested the hypothesis that "A training device or a training procedure is no better than the using instructor thinks it is."

There is much to be said, also, about the quality of instruction. Some work has been done to measure or appraise the performance of instruction, but what experimentation have you seen in the area of *improving* instructor performance? Suppose, for instance, that an experimental group of instructors was observed in their class rooms at least once each two weeks. The observer, on each visit, fills out a check list of behaviors he can observe in the training situation. Within the week of the observer's visit, he will review and discuss his observations with the instructor concerned or with small groups of instructors. Would this improve the learning of trainees?

Almost all training research gets into the problem of "evaluation of training." Perhaps the most difficult part of this problem is that of defining in detailed operational terms the hoped-for outcomes. Consider, for example, Executive training: What evidence can be observed that may be used to reflect the effects of the training? What consequent differences in behavior, attitude, etc., can be observed?

Perhaps our greatest need, in training research, and perhaps our greatest opportunity for fruitful research outcomes, lies in the area known to psychologists as "individual differences." Much of the research on training methods has been aimed at relative effectiveness of method relative to kinds of subject matter. Might it be that the more pertinent individual differences—to which we give lip service—have their loci in the persons being trained?

We have developed many tools for reflecting individual differences, but have used these primarily in the area of selection.

Let us illustrate this idea. I recognize that some research has been done

in these areas, but not enough to convince those who set up training programs that it makes enough difference to pay off.

Some people can learn more rapidly than do others. Why not arrange training so that some may take longer than others? Those with higher gearing may take less time. This kind of program demands measurement of competence or achievement, if all are to be trained to the same standards. It is administratively feasible in a large training organization where slower and faster groups can be set up. This kind of scheme is of particular value in the area of jobs for which there are "critical shortages" and it is desirable to get more people trained—even at greater cost.

And again some people have already learned more than others! And why, except for administrative inconvenience and the lack of instruments for measuring their accrued and pertinent knowledges and skills, should we take the time to reteach them what they already know?

This concept has been used to good effect for economy in training and for creating good attitudes toward training as well.

Now let's consider a third notion growing out of the concept of individual differences: the hypothesis that men who differ in their patterns of cognitive abilities and skills will learn more effectively when trained with correspondingly different methods.

Research on this topic might be organized as follows:

1. Within a training program, organize the complete program as three separate complete programs, each using a different training method and each designed to be as effective as possible. Three such methods, in terms of Thurstone's Primary Abilities, might be:
   a. first, essentially a rote method for individuals who score high on the memory factor.
   b. second, a theoretical and self-critical approach for those who score high on the inductive factor, and
   c. third, for those who score high on the deductive factor, a method where the question "why" is always asked might prove more effective.
2. Set up methods of measuring training outcomes (written, oral, and performance test), giving no undue advantage to any one training method.
3. Administer the Thurstone Primary Abilities Test, or other appropriate classification test, to the personnel as they are assigned to that school.
4. Assign students to the three teaching methods at random. At the end of the course, collect the measures of outcome, both in terms of achievement and in terms of attitudes.
5. Make an analysis of test scores and outcomes according to teaching methods.
6. If Step 5 does not support the hypothesis, the experiment is over. At this point there will be two benefits; first, doubt cast on the hypothesis; and second, a good set of examination instruments will be available for the course.
7. If Step 5 supports the hypothesis, the experimenter should start with a new sample of trainees, administer the tests, and assign personnel to training methods on the basis of tests.

8. At the completion of the course, measure the outcomes as done in Step 4, and make comparisons with other data available from the study.

The idea for this study stems from an exploratory study made in the mid-30's which indicated that such hypotheses might be tenable since the correlation of the factor scores with performance in different subject matters could most readily be accounted for by known differences in teaching method.

In the way of summary—

We can use good research in training—Too much we are dependent on rule of thumb.

Research on training has to be carefully designed to produce clear results, and just as important—to permit it to be done.

It is difficult to identify the most fruitful areas—

Development of keener and perhaps new kinds of evaluation procedures is a must.

Utilization of concepts of individual differences may open new vistas.

2. Effects of Feedback on Insight and Problem Solving Efficiency in Training Groups *

Ewart E. Smith
Stanford S. Kight

Human relations courses in management development programs are currently very popular, despite a dearth of experimental evidence supporting the postulated learning principles used in constructing these courses. Two such principles have been tested in the field experiment reported here.

The hypotheses were:

1. Feedback will: (*a*) increase group productivity and (*b*) increase self-insight.
2. Subgroup structure will result in: (*a*) increased group productivity and (*b*) increased self-insight.

Method. *Subjects and Situation.* The subjects (Ss) were 54 male and 49 female first level supervisors (foremen) in a large eastern corporation. They were participating in a five-day management training course which stressed interpersonal factors in management. The course emphasizes

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experiential learning, with role playing exercises, demonstrations of perceptual fallibility, group discussions, etc., and only a few short informal lectures. Nine training groups varying in size from 11 to 13 were used. Each group contained both men and women. The Ss did not know they were participating in an experiment.

Experimental Design. In experimental Condition A, small feedback groups of three or four members each were established. These feedback subgroups were scheduled to meet for 30 minutes at the end of each half day. However, 60 minutes per day proved to be more time than was readily available. Less and less time was given to the subgroups as the original commitment to research on the part of the company staff faded with time. Consequently, data were obtained on the amount of time actually spent in subgroups.

The Ss were given an outline to guide them in their feedback sessions, which asked the individual to describe to his subgroup how he saw his own behavior, why he behaved as he did, etc. The subgroup members were then asked to compare their perceptions of his behavior with his account of it. In addition, the subgroup was asked to give the individual feedback on how his behavior affected the leadership problems of the group, whether he talked too much or too little, whether he was trying out new behavior or playing it safe, etc.

Condition B was similar to Condition A in that the Ss were placed in subgroups of three or four members each. These subgroups were scheduled to meet for 30 minutes at the end of each half day, to discuss the course content covered the preceding half day. Such topics as what they had liked best or least, what they had learned, etc. were covered. Condition B was designed as a control condition to determine if any changes produced by the feedback in Condition A could be attributed to subgrouping rather than feedback, and also as a test of the postulate that subgrouping per se will increase learning in training groups.

Condition C was a straight control condition with no induced feedback or subgrouping.

Three training groups were assigned to each condition. The courses were conducted in the usual manner by the company's training staff. Each group had two leaders who had had some training and considerable experience in conducting these courses. These leaders were males holding third-level supervisory positions in the company. *E* was introduced to the group as a consultant at the end of the course on Friday afternoon, when the testing was done.

Dependent Variable Measurements. Group productivity was measured by the number of problems solved by each three person subgroup. In Conditions A and B, the subgroups tested on the problem solving task were the same ones which had been meeting during the week for feed-

back, or to discuss the content of the course. In Condition C the subgroups were produced for the problem solving task by placing the first three people sitting together in one subgroup, placing the next three sitting together in the next subgroup, etc.

The problem solving task (Taylor & Faust, 1952) is an adaptation of the parlor game "Twenty Questions" in which the *Ss* had to identify items designated by the experimenter as either animal, vegetable, or mineral. Each problem had to be solved with less than 40 questions for the subgroup to receive credit. No time limits were applied to the solving of particular problems, but the productivity of each subgroup was measured by the number of problems solved in 10 minutes. To each question asked by a group member, *E* replied in one of the following ways: (*a*) yes, (*b*) no, (*c*) partly, (*d*) sometimes, (*e*) not in the usual sense of the word, (*f*) I don't know (no charge for the question), (*g*) please restate the question (if the question was unclear or could not be answered in one of the above ways). Difficult items such as wrench, ruby, and bread were used. This task has, in other investigations (Goldman, Bolen, & Martin, 1958; Smith, 1957; Taylor & Faust, 1952), successfully discriminated between groups whose effectiveness could be judged on other criteria.

Self-insight was measured by having each conferee indicate, for each of 10 leadership roles, who (including himself) took the role well. An insight score was computed by determining the discrepancy (ignoring the sign) between the number of roles *S* credited to himself, and the average number of roles credited to him by the two staff leaders. Self-insight of foremen has been shown to be highly related to the productivity of their departments (Nagle, 1954).

An anonymous evaluation of the training course was also obtained from each conferee by asking him to rate the course on a five point scale in the following three areas: how much he felt he benefited from the training, how much he felt he learned about himself as a result of the training, and how helpful he felt the training would be back on the job.

Results and Discussion.[1] As an analysis of the data on all measures indicated that Control Conditions B and C were not different, they have been combined. This failure of Conditions B and C to differ indicates that subgroup structure did not have the hypothesized effect on learning and that any effects occurring in Condition A result from feedback alone.

Plotting the group task scores revealed that normal distributions could not be assumed. Consequently, a nonparametric rank test was used (Edwards, 1954). By this method a z is obtained which is a normal deviate, evaluated by the use of the normal probability table. The median number of problems solved by the 10 three-person subgroups in the feedback con-

[1] Statistical significance at the .05 level has been indicated by a single asterisk; at the .01 level or better by a double asterisk.

dition was 2.00, compared to a median of zero for the 21 control subgroups. The z on these data is 2.27*. These differences are highly consistent, as revealed by categorizing the subgroups according to whether they solved one or more problems or were unable to solve any. With such an analysis, we find that all of the feedback subgroups solved at least one problem, compared to nine of the control subgroups (the p on these data is .002 by Fisher's exact test).

Feedback, then, consistently produced greater problem solving efficiency. It should be noted, however, that these data do not indicate whether feedback made the conferees more effective members of problem solving groups in general, or only made these particular subgroups more efficient.

If all feedback and control groups are compared on insight scores, they are not significantly different. However, as we see in Table 1, the strength

Table 1. Mean Insight Scores under Experimental and Control Conditions

	Data under Each Condition			
	Feedback			
Statistic on Insight Score	I	II	III	Control
Number of minutes in feedback subgroups ...	230	193	165	0
Mean	.90	1.73	2.38	2.41
n	10	11	12	69

Note.—Low scores indicate insight CR on Feedback I and Control, 3.14**; t on Feedback I and Feedback III, 2.12*.

of the feedback independent variable was gradually reduced by a decline in the amount of time the company's training staff devoted to the feedback subgroups. It is interesting to note the perfect negative correlation between the amount of time spent in feedback subgroups and the mean insight error scores. As indicated in Table 1, the first feedback group, which came closest to receiving the specified amount of time in feedback subgroups (300 minutes) had significantly lower insight scores than either the last feedback group or the control groups.

The mean rating of the course by the conferees in the feedback condition was 12.97, which is significantly lower (CR 2.27*) than the mean of 13.66 for the control condition. In view of the superiority of the feedback condition as indicated by the problem solving and insight measures, it would appear that the frequent use of the opinions of conferees for evaluating industrial training programs should be re-evaluated.

Summary

An experiment was conducted in a field setting to investigate two of the learning principles utilized in human relations courses. The Ss were 103 first line supervisors, in groups of about 12, in a one week, highly participative management course. In the experimental condition, the training groups were divided into three-person subgroups which met twice daily to give each other personalized feedback on their behavior in the group. In one control condition, there were twice daily meetings of three-person subgroups which discussed the content of the course, and in the other control condition there was no subgrouping.

The hypotheses tested in the present study were:

1. Feedback will: (*a*) increase group productivity and (*b*) increase self-insight.
2. Subgroup structure will result in: (*a*) increased group productivity and (*b*) increased self-insight.

The data indicated that personalized feedback markedly, and consistently, improved group problem solving efficiency. Under some conditions, feedback improved self-insight. Anonymous evaluations of the course by the trainees favored the control conditions, indicating that conferee ratings may not be an adequate basis for evaluating such courses. The hypotheses regarding subgroup structure were not supported.

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3. An Experimental Test of the Effect of Training on Discussion Leadership *

Norman R. F. Maier

Introduction. In previous experiments (3, 4) the author has shown that a discussion can improve the quality of group decision (a) by giving the person with a minority opinion a chance to be heard and (b) by asking questions and reflecting ideas in the group so as to cause the group to explore ideas together. The purpose of the present experiment is to explore still another aspect of leader influence on group discussion. It deals with the influence of training leaders to use a permissive approach as against the approaches generally practiced in business. The statement of the problem raises two questions.

1. will the training given have any effect on the leaders' behavior? and
2. is the training given to the leaders of the type that facilitates the solving of problems?

Training in human relations may fail to show up in a practical situation for one of the following three reasons: (*a*) the training does not offer a better approach than the one already in existence; (*b*) the supervisor may not have learned enough to profit from the training; and (*c*) the supervisor may have learned enough skills to profit, but he fails to practice what he has learned because of pressures outside himself. It is important that these reasons be treated as separately as possible and the purpose in this study is to eliminate the third reason as an interfering factor, since Hariton (1) found it to be a restraining force, and one out of a trainer's immediate influence.

In this instance we are concerned with the value of training leaders in a permissive style of conducting group discussion meetings and agreeing on an action to be taken by asking employees to participate in obtaining the solution to a problem.

Experimental Design. In order to have the same set of conditions repeated so as to permit comparisons of large numbers of groups, and at the same time to introduce realistic ego-involvements, it seemed best to

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set up the experiment as a Multiple Role-playing situation (2, 5) and present all groups with the same industrial problem. In each group, one person, chosen at random, was to serve as foreman and three others to act as employees reporting to the foreman. This procedure permitted the experimenter to place many groups of four persons in the same relationships with each other and to confront them with the same problem. An uncontrolled variable was that of the differences in personalities that various persons would add to the roles supplied them. This variable is neutralized by using a number of groups.

The experimental variable was the training in group decision which was given to the experimental groups and omitted from the control groups. Thus in 44 groups the persons were exposed to 8 hours of presentation on the nature of the group decision method and how it could be adapted to dealing with job problems. The training emphasized the point that if employees are allowed to participate in solving a problem they will be able to get together on a solution that they are willing to accept. The foreman's functions in such discussions are to present the facts and the conditions bearing on the problem and to conduct a permissive discussion.

Four hours of discussion also were part of the training. The discussions permitted (*a*) an expression of attitudes in the participants, (*b*) opportunities to ask questions, and (*c*) opportunities to air personal views. The presentation and discussion periods were combined in three training periods of about 2½ hours each. The role-playing problem was introduced as a part of the training program.

A total of 36 other groups were given no training except for a half-hour lecture given in connection with introducing the problem for role-playing. The lecture was on the subject of resistance to change and emphasis was placed on (*a*) the importance of recognizing differences in attitudes in employees, (*b*) the importance of employees accepting changes in jobs if these are to be made successfully, (*c*) recognizing that all employees do not have the same motivations, and (*d*) listening to what employees have to say in order to understand them.

All of the trained and untrained persons were industrial personnel consisting primarily of first line supervisors and intermediate management. Thus any experiences they had in dealing with people varied about the same way in the trained and untrained groups. In no instance did the participants know that an experiment was being performed since role-playing this particular problem was set up as a part of a human relations training program. The difference between the groups, therefore, was the point at which this particular part of the training was introduced into the program. Role-playing was introduced into both experimental and control sets of groups by informing the audience that they were about to participate in solving a lifelike job problem. "The problem to be presented involves a

foreman who must talk over a job matter with three of his employees. This situation will give you a first hand experience with the types of influence which operate." They were then told that they would be divided into groups of four and given a set of instructions which would give each of them a particular part to play in this situation. They were asked to accept the roles, to imagine themselves in the situation described, and to interact with each other in a natural manner. They were informed that the roles would only give them a starting point. Once the discussion had begun they would find that they would be influenced by each other and that they should let their behaviors change as circumstances in the group dictated. In other words, they were asked to start out with the roles supplied and let things develop as in a real life situation.

The persons present were then divided into groups of four. (The experiment was repeated five times in order to accumulate the 80 groups.) Each group was given a set of instructions (one page for each member) and the person who took the set from the assistant was made the foreman. He kept the top page and passed a page with a role to each of the other three persons.

It will be noted that the persons playing the part of the foreman as well as those playing the part of the employees were trained in group discussion in the experimental group. It was felt that this condition actually would exist in an industry in which group participation methods are used over a period of time. However, it was important that the participants in the untrained groups be not trained more than the leaders since this condition might make them critical of the supervisors' approach. Thus both sets of leaders worked with groups whose backgrounds were similar to their own.

In order to compare the effectiveness of the discussion led by the foremen in the trained and untrained groups it is desirable to have a problem which involves both quality of decision and acceptance of decision in order to become a success in practice. It is generally conceded that acceptance is better where participation is used and hence it is important that the quality of the decision is also recognized.

Both the trained and untrained groups were allowed 30 minutes for discussion time. Preliminary experience indicated that this amount of time is adequate for most groups.

The Experimental Problem. The problem used for Multiple Role-playing is entitled "Changing Work Procedure." It deals with a situation in which there is resistance to change. The men are doing an assembly job and work in teams. To reduce boredom the men change jobs. Since each man does his best work on a particular operation the talents of the men would be used more effectively if each man worked continuously on the operation for which he was best suited. This means that the foreman will

raise the problem of change. Resistance to change appears in the form of (*a*) a desire to avoid monotony, (*b*) fear of rate cuts and (*c*) hostility toward the time-study man. The first of these resistances to change may be regarded as intellectual in that the realistic factor of boredom is involved; the last two are emotional in that distrust and imagined threats are involved. These make the problem sufficiently difficult so that good discussion leadership is needed to resolve the conflict.

The roles supplied for the problem are as follows:

Role for Gus Thompson, Foreman. You are the foreman in a job and supervise the work of about 20 men. Most of the jobs are piece-rate jobs and some of the men work in teams and are paid on a team piece-rate basis. In one of the teams, Jack, Walt, and Steve work together. Each one of them does one of the operations for an hour and then they exchange, so that all men perform each of the operations at different times. The men themselves decided to operate that way and you have never given the plan any thought.

Lately, Jim Clark, the methods man, has been around and studied conditions in your shop. He timed Jack, Walt, and Steve on each of the operations and came up with the following facts.

Time per Operation

	Position 1	Position 2	Position 3	Total
Jack	3 min.	4 min.	4½ min.	11½ min.
Walt ...	3½ min.	3½ min.	3 min.	10 min.
Steve ...	5 min.	3½ min.	4½ min.	13 min.
				34½ min.

He observed that with the men rotating, the average time for all three operations would be one-third of the total time of 11½ minutes per complete unit. If, however, Jack worked in the No. 1 spot, Steve on the No. 2 spot, and Walt in the No. 3 spot, the time would be 9½ minutes, a reduction of over 17 per cent. Such a reduction in time would amount to saving of more than 80 minutes. In other words, the lost production would be about the same as that which would occur if the men loafed for 80 minutes in an 8-hour day. If the time were used for productive effort, production would be increased more than 20 per cent.

This made pretty good sense to you so you have decided to take up the problem with the men. You feel that they should go along with any change in operation that is made.

Role for Jack. You are one of three men on an assembly operation. Walt and Steve are your team mates and you enjoy working with them. You get

paid on a team basis and you are making wages that are entirely satisfactory. Steve isn't quite as fast as Walt and you, but when you feel he is holding things up too much each of you can help out.

The work is very monotonous. The saving thing about it is that every hour you all change positions. In this way you get to do all three operations. You are best on the Number 1 position so that when you get in that spot you turn out some extra work and so make the job easier for Steve who follows you in that position.

You have been on this job for two years and have never run out of work. Apparently your group can make pretty good pay without running yourselves out of a job. Lately, however, the company has had some of its experts hanging around. It looks like the company is trying to work out some speed-up methods. If they make these jobs any more simple you won't be able to stand the monotony. Gus Thompson, your foreman, is a decent guy and has never criticized your team's work.

Role for Steve. You work with Jack and Walt on an assembly job and get paid on a team piece-rate basis. The three of you work very well together and make a pretty good wage. Jack and Walt like to make a little more than you think is necessary but you go along with them and work as hard as you can so as to keep the production up where they want it. They are good fellows; often help you out if you fall behind and so you feel it is only fair to try and go along with the pace they set.

The three of you exchange positions every hour. In this way you get to work all positions. You like the Number 2 position the best because it is easier. When you get in the Number 3 position you can't keep up and then you feel Gus Thompson, the foreman, watching you. Sometimes Walt and Jack slow down when you are on the Number 3 spot and then the foreman seems satisfied.

Lately the methods man has been hanging around watching the job. You wonder what he is up to. Can't they leave guys alone who are doing all right?

Role for Walt. You work with Jack and Steve on a job that requires three separate operations. Each of you works on each of the three operations by rotating positions once every hour. This makes the work more interesting and you can always help out the other fellow by running the job ahead in case one of you doesn't feel so good. It's all right to help out because you get paid on a team piece-rate basis. You could actually earn more if Steve were a faster worker, but he is a swell guy and you would rather have him in the group than someone else who might do a little bit more.

You find all three positions about equally desirable. They are all simple and purely routine. The monotony doesn't bother you much because you can talk, daydream, and change your pace. By working slow for a while and then fast you can sort of set your pace to music you hum to yourself.

Jack and Steve like the idea of changing jobs and even though Steve is slow on some positions, the changing around has its good points. You feel you get to a stopping place every time you change positions and this kind of takes the place of a rest pause.

Lately some kind of efficiency expert has been hanging around. He stands some distance away with a stop-watch in his hand. The company could get more for its money if it put some of those guys to work. You say to yourself, "I'd like to see one of those guys try to tell me how to do this job. I'd sure give him an earful."

If Gus Thompson, your foreman, doesn't get him out of the shop pretty soon you're going to tell him what you think of dragging in company spies.

Results. A number of outcomes is possible for the type of problem used in this study. Since certain facts in the situation are supplied it is perhaps safe to assume that a realistic recognition of these facts would result in the solution of highest quality. Thus most persons would agree that if employees were willing to change their work method in conformity with the time study man's figures the discussion would be considered a success; at least this type of solution would be the foreman's objective.

Failure, on the other hand, would be indicated if (a) the group refused to change their present method of working, (b) no decision could be reached in the allotted time, or (c) the foreman imposed his solution and the men rebelled.

Between these two extremes there are also intermediate solutions which may be considered compromises. Two types of compromises have been reported. In one, the employees continue rotating as formerly, but schedule themselves in order to spend more time on the position where they are most competent. Thus, a given employee may spend one hour at each of two positions and two hours at his best position. The other compromise is for two men to exchange jobs periodically while the third continues to work on his best position. Jack and Walt might exchange Positions 1 and 3 while Steve continues on Position 2.

It might be argued that these compromise solutions actually may be superior to the solution suggested by the time study man since boredom has been properly recognized and treated. However, the more conservative position would be to avoid this controversy in the present analysis.

Table 1 gives the types of solutions presented by both trained and untrained groups. General observation reveals that in the outcomes classified as *failures* the untrained groups offer the greater variety. Thus for these groups there are three types of failures. These occur when a group (*a*) rebels against the foreman's imposed decision; (*b*) specifies no action (no solution), or (*c*) has a foreman who gives in and makes no change. In the trained group failure is registered only when the foreman gives in and accepts a group's refusal to change.

The striking thing about the compromise solutions is that these occur

Table 1. Solutions Reached in Groups with Trained and Untrained Leaders

Type of Group	No. of groups	Failures Resistance to Change Not Overcome			Compromises Partial Changes in Method		Foreman's Objective Full Change in Method		
		1 Walk out	2 No decision reached	3 Continue rotation	4 More time on best position	5 Jack and Walt rotate, but not Steve	6 Work best position plus rest pause	7 Work best position and help each other	8 Work best position
Trained	44	0	0	2	5 (1)	11 (1)	2 (1)	4 (1)	20 (13)
Untrained	36	2	8	8	0	0	0	0	18 (16)

only within the trained groups (see middle part of Table 1). These possibilities never arise as considerations for bringing about a meeting of minds in the untrained groups.

Similarly, the acceptance of a full change (foreman's objective) in work methods (last part of Table 1) shows some variation in the trained groups but not in the untrained groups. Thus rest pauses and helping each other become parts of the solution when "working the best position" is accepted, but these additions never become attached to solutions in the untrained groups.

Table 1 also gives the frequency with which provisional solutions arise. A provisional solution is one that group members agree to try for a specified period of time, with the understanding that they will then reconsider the problem. The frequency with which this condition is attached to various solutions is shown by the numbers in parentheses. Thus in column 8 we find that 20 of the trained groups agreed to work their best position, and in 13 of these instances this was a trial period (which was specified).

The frequency of provisional solutions may be considered a measure of unresolved resistance stemming from doubts. In the 44 experimental groups, 17 solutions (38.6 per cent) carried this provision, whereas in 36 control groups 18 solutions (50.0 per cent) did so. Thus despite the facts that provisional solutions are associated with change, and the control group has the smaller proportion of changes, it still has the higher percentage of provisional solutions.

Table 2 presents the general results in a more summarized manner.

Table 2. Percentage of Successes, Failures, and Compromises in Trained and Untrained Groups

	Failures	Compromises	Successes
Trained Leader	4.5	36.4	59.1
Untrained Leader	50.0	00	50.0

From this table it can be seen that the solutions of the trained leader groups may be classified as: 4.5 per cent failures; 36.4 per cent compromises; and 59.1 per cent successes. The solutions of the untrained leader groups may be classified as: 50.0 per cent failures; 00 per cent compromises; and 50.0 per cent successes. The differences in the distributions of solutions into these three classifications is significant well beyond the .001. (Chi Square = 29.7519 with 2 degrees of freedom.)

The striking feature of the difference in the distribution of solutions in the two sets of groups is not that training markedly increases the degree of acceptance of the solution that the foreman might have had in mind,

but rather that training of the discussion leader prevents failures from occurring. The primary procedure used by the untrained leader is to attempt to sell his solution to the group, whereas that of the trained leader is more to raise the problem with the group for discussion. In the light of this emphasis on a particular solution it is interesting to find that the foreman's solution is slightly less frequently accepted by the groups in which the pressures to accept it are the strongest. Thus the solution of "working the best position" was accepted 50 per cent of the time when the foreman emphasized its virtues and 59.1 per cent of the time when this was done to a lesser degree. It seems justifiable to conclude, therefore, that a foreman who tries to sell a solution to a problem is not more likely to sell this solution to his group than is a foreman who is more concerned with discussing the problem. The big gain for the latter type of foreman is that he avoids failures.

The degree of good feeling resulting from the discussion was measured by asking the foreman to indicate which of the employees he would consider a problem individual. Table 3 shows the number of times Jack, Walt,

Table 3. Measure of Acceptance of Solution Proposed

	No. of Groups	Problem Employees			
		Jack	Walt	Steve	Per Cent of Employees
Trained groups	44	4	9	1	10.6
Untrained groups	36	11	12	4	25.0

and Steve were indicated as problem employees. It will be seen that in the trained groups Jack was mentioned 4 times, Walt 9 times and Steve once. Thus in the 44 groups (consisting of 132 employees) 14, or 10.6 per cent of the employees were mentioned. In the untrained groups, Jack was mentioned 11 times, Walt 12 times and Steve 4 times. In the 36 groups (consisting of 108 employees) 27, or 25 per cent of the employees were mentioned as problems. The Chi Square (1 degree of freedom) of the difference equals 8.6882, which means that the difference in the number of problems is significant beyond the 1 per cent level.

This indicates that the untrained leaders had a much less satisfying time in their discussions than did the trained leaders. The fact that each of the employees was a problem in one group or another indicates that the inter-personal relations that occurred in the role-playing, rather than the type of role supplied to the individual, contributed to the types of clashes in personality that occurred.

Dissatisfaction of the employees was primarily associated with the

solutions reported as failures. Thus in each of the 18 untrained groups that are classified as failures there were from 1 to 3 dissatisfied employees. There was 1 dissatisfied employee in the two trained groups whose solutions are classified as failures. One other dissatisfied employee was found in the remaining 42 experimental groups and four were found in the 18 control groups which accepted the foreman's solution. It seems then that satisfaction was largely associated with the acceptance of solutions regardless of the methods used by the foremen. The style of leadership influenced satisfaction primarily because it increased the frequency with which solutions were accepted.

Discussion of Results. The results of this study clearly show that a group's resistance to change can be sharply reduced by training the leader for 8 hours on group decision procedures. The primary difference between trained and untrained leaders' conference procedures is that the untrained leader attempts to motivate his group to accept the change in work methods by pointing out that more money will be made. He is inclined to refute objections and thus engenders hostility. The trained discussion leader, however, is more inclined to present the situation as a problem and to listen to suggestions and criticisms raised by his group. Although many of the trained leaders do revert to selling procedures they tend to be more tolerant, considerate and open to suggestions.

As a result of the difference in the leader's approach, solutions of those trained in group decision tended to be either acceptance of the implied solution or the development of some compromise solution. Discussion leaders untrained in group decision try to do a selling job. As a result, they either sell their solution, or they completely fail to convince the group, with the result that hard feelings are developed. The fact that untrained leaders do not sell the desired solution more often than trained leaders indicates that this solution has a certain amount of appeal in itself and that the selling approach alone has very little effect, except to exclude the possibility of compromise. Thus complete failures and dissatisfaction replaced the compromise solutions and satisfaction in the untrained groups. The compromise solutions should not be regarded as partial successes since they may actually be superior to the solutions advocated by the leader.

It is apparent that differences in leadership skill existed within both sets of groups. However, the important thing is the demonstration that leadership style plays a very important part and that this style can be acquired through training. How much more skill in group leadership can be acquired with additional training remains to be investigated.

It is possible to raise certain doubts regarding the interpretation of these findings. Since both the discussion leaders (foreman's role) and the participants (roles of Jack, Walt and Steve) received training, one

might suppose that the differences in outcome were influenced by the fact that the trained participants were more agreeable and cooperative. The writer does not consider this a realistic objection since leadership skill was for the leader to exercise and not a factor that would influence a participant in the direction of tolerance. If anything, the participants in the trained group would tend to be more critical of the leader's conduct and hence would tend to react more violently to procedures which were out of line with the training. However, the experiment should be repeated if it is felt that this argument is unsound. The present experiment demonstrates that the magnitude of differences obtained is sufficiently great to be measured and hence constitutes a practical design which can be repeated under conditions in which none of the participants is trained.

It might also be argued that the outcome of role-playing problems cannot be generalized to real life problems. This, of course, is debatable. Certainly it would be desirable to test this question experimentally in real life situations. However, the difficulty is that the same conditions cannot be repeated in many groups so as to permit a controlled experimental design.

Those who have worked with role-playing recognize how realistically it captures real life situations. Because it simulates real life problems it is extremely useful as a training method. Furthermore, there is a real life aspect to group decision problems as seen in the one used in this experiment. Regardless of whether a participant fully adopts the role assigned to him, he is placed in a problem situation and must agree with others on a solution. To the extent that each person is involved in a problem the situation is real and personal for him. The roles merely add some additional attitude loadings such as are found in comparable life situations.

An important difference between testing the effects of training through role-playing and in real life situations is that in role-playing there is less resistance to trying out newly acquired skills than under practical conditions. This is due to the fact that (*a*) restraints from higher management are absent, (*b*) the fear of the consequences of failure is present to a much lesser degree, (*c*) embarrassments, which may be anticipated because of a change in procedure, are absent since the supervisor is dealing with a new group and (*d*) irritations with individuals are at a minimum because the discussion leader is less emotionally involved himself. However, it is because those restraining influences are absent in role-playing that this method becomes ideal for measuring skill by itself. The extent to which skills are inhibited by restraining factors is a separate type of study. Certainly the degree to which leadership skills are lost when the leader becomes frustrated is an important study in itself.

Conclusions

In so far as differences were obtained as a result of training in group decision procedures, this experiment indicates that leaders can favorably influence the outcome of discussions by presenting participants with problems rather than with solutions. In supplying the relevant facts, the trained leaders caused solutions to emerge which were at least as good as those supplied by the untrained leaders. The important gain was that the trained leaders almost completely avoided failures and in their stead obtained alternate solutions, some of which might have been of higher quality than the solution established as the satisfactory one.

Further, one may conclude that with 8 hours of training this type of leadership can be acquired to a sufficient degree to produce a marked difference in outcome. This does not mean that supervisors receiving this training will use it on the job. Rather, they have the ability to use it on the job providing conditions are such as to motivate them and serious restraining influences are absent.

Summary

A total of 176 supervisors in industry were given 8 hours' training in group decision. Another 144 supervisors received no training, but instead were given a lecture on attitudes. The trained supervisors were then divided into 44 groups of four each and the untrained supervisors were divided into 36 groups of four each. All groups were tested by being confronted with a role-playing problem in which one member served as foreman and the other three played the parts of his employees working on a sub-assembly job. The situation confronting each group was one in which the foreman obtained facts which suggested a more efficient method of doing the assembly. Since the men worked on a group piecerate basis the suggested method meant a gain in earnings. However, the rules supplied the workman introduced the kinds of suspicion ordinarily associated with such a change.

Measures were made of the outcome of discussions held by both experimental (trained) and control groups. It was found that 50 per cent of the control groups accepted the change in work methods implied by the foreman's facts whereas 50 per cent of the groups rejected his recommendations. In the trained group, 59.1 per cent of the groups accepted the above mentioned change and only 4.5 per cent refused to make any changes. The remaining groups (36.4 per cent) agreed to other types of changes, which may be regarded as compromises.

Other significant differences favorable to the trained group also were

obtained. The number of employees viewed by the foreman as problem employees was 10.6 per cent for the trained groups and 25.0 per cent for the untrained groups. Employee satisfaction with the outcome was greater for the trained than the untrained group, primarily because agreement was reached more frequently in the trained groups than in the untrained groups. When the untrained groups reached agreement they, too, tended to be satisfied.

Since persons playing the part of foreman in the untrained groups tended to try to sell a solution, whereas persons playing the part of foreman in the trained group tended more to conduct a discussion of a problem and obtain a solution from the group, it is concluded that the latter approach is a far more effective method for leading a discussion than is the selling approach. Furthermore, it is concluded that 8 hours of training will produce enough skill to markedly differentiate trained from untrained personnel. However, the problem of motivating these trained supervisors to practice on the job the leadership skills they have learned is still another matter. Attitudes of higher management and other factors in the practical situation may completely prevent supervisors from utilizing their newly acquired skills. It is because a role-playing situation reduces the restraining influences that act on the individual from the outside that it becomes an ideal method for measuring skills by themselves.

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4. Encapsulated Training *

Mason Haire

When the training department is directed to make a change it has a very special problem. Let us consider the problem of foreman training. The foremen come to class to be told how to be foremen. On the job they have a particular role and style that is recognized by their subordinates. They are seen in a particular way by their superiors. They have a set of techniques for dealing with people which are the basis of their present success. It is by behaving this way that they have gotten where they are. The training supervisor now tells them to do things differently. What are they to do? If they go back on the job to behave differently, they are insecure for several reasons. First, they have just given up their accustomed ways and are about to try techniques which they are not sure they can do and which they may understand imperfectly anyway. Secondly, not only does the foreman no longer have the same role in his own eyes, but he has a new role in his subordinates' eyes. The change makes them insecure and uneasy and difficult to deal with, and adds problems to those contributed by the newness of his own techniques. Finally, he is fearful of his new role in his superiors' eyes. They have seen him relatively successful in his old ways of operating (or he wouldn't be foreman), and now he must change. Won't they say "Old Joe is slipping"? Nowhere—in his own eyes, in the view of his subordinates, or in that of his superiors—is there any security in the new forms of behavior. Only the training department stands behind him. How much safer for him to do exactly what he has been doing all along and what has brought him at least some success so far!

However, the training department also has a culture and controls a set of values. For the foreman it is a continuation of much of the pattern that he was used to in school. Here is the series of rows of chairs with a figure who stands in front and speaks authoritatively, and who passes out approval and disapproval for certain kinds of behavior. He must attend these meetings, and within the meetings he will fit into the cultural patterns of this group as surely and as quickly as possible. We have really

* From *Psychology in Management,* by Mason Haire. New York: McGraw-Hill Book Company, Inc., 1956, Chap. 5, "Training," pp. 102–104. Reprinted by permission of the publisher and author.

put him into a new situation in which he must learn something. In the first place he has a job, and he has learned a good deal about how to behave there. Now he must go to meetings. The company clearly wants him to go. The trainer has certain values and standards. He must learn to behave in this pattern. The usual result is that as the meetings progress the foreman progresses in that from meeting to meeting he behaves more and more the way the trainer wants him to—within the meeting. He learns to say the kinds of things the trainer approves of and to work in terms of the trainer's frame of reference—within the classroom. However, when he leaves the meeting and goes back to the job he tends to do exactly as he did before. There is little reason to change. On the job he gets reward and approval from one group of people for doing certain kinds of things; within the classroom he gets reward and approval from another group of people for doing rather different things. There is no real reason to carry over from one to the other. Fortunately, the two are usually well separated in time and space, so that they don't come in contact. Indeed, the foreman would be taking a ridiculous risk to follow the trainer's suggestions unless there were clear and consistent evidence at every point *outside the classroom* that his superior's values coincide exactly with the trainer's. This very seldom occurs. It is almost impossible, if the line superior feels that he is not responsible for training and that it should be turned over to the staff department. In the absence of this unity the foreman must do one thing in one situation and another in the second. On the job he follows the culture of the work group and the line superior, and in the classroom he follows the values of the classroom group and the training supervisor. The training is encapsulated within the classroom; the progress he makes from week to week stays there. He tends to leave it there rather than to take the risk of trying it outside. The smart student will be careful not to accept change in one group and meet an unchanged superior on the job.

It is not only on the job that we allow this encapsulation of training to grow up. It is quite as customary to say to a new graduate on the job, "That may be the way you learned to do it in college, but you're on the job now, so just forget that. We'll show you how it's really done." Here we have let the split between the trainer and the supervisor grow as wide as possible. In many ways it is necessary, for the training organization involved in our educational system is too large and too specialized to be done as part of an apprentice program. However, here too, it probably would be of benefit both to the schools and to the employers if there were a closer harmony between the two in terms of the kinds of values and skills and attitudes that were taught, so that it would minimize the gulf between them. Then it might be more nearly possible for us to train students to take a job; instead of merely training them and having them take a job afterward.

5. Are We Using What We Know about Training? Learning Theory and Training *

William McGehee

There is no way to make this subject light. So I am going to start by defining the various concepts in my topic so that we (or at least I) will be reasonably certain about what I am trying to write.

First let us look at the term "theory." This is generally an anathema to the practical man. Yet in spite of its rather disreputable status among the "doers," these same characters make use of theory at least in a crude form. So let us examine the nature of theory.

A theory according to George Kelly is "a way of binding together a multitude of facts so that one may comprehend them all at once." [1] Kelly maintains that a theory, even if it is not highly scientific, can be useful since it can give meaning to our activities and provide a basis for an active approach to life. So even the theory that "13" is an unlucky number can lighten the life of a bookie. Likewise the theory that role playing, or case study, or visual aids, or the incident method is an answer to a training director's prayer is extremely comforting in his everyday life even if the theory is not highly scientific.

When a theory enables us to make reasonably precise predictions, one may call it scientific. The nearer theories come to precision of predictions, the more useful they are for controlling the phenomena with which they deal. To quote Kelly again, "Theories are the thinking of men who seek freedom amid swirling events. The theories concern prior assumptions about certain realms of these events. To the extent that the events may, from these prior assumptions, be construed, predicted, and their relative courses charted, men may exercise control and gain freedom for themselves in the process." [2]

Learning theory, then, is simply a way of binding together the facts known about the process we call "learning." Learning, itself, is a construct—an abstraction. No one of you has ever seen "learning." You have

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[1] George A. Kelly, *The Psychology of Personal Constructs* (New York: W. W. Norton & Co., 1955), Vol. I, p. 18.

[2] *Ibid.*, p. 22.

seen people in the process of learning, you have seen people who behave in a particular way as a result of learning, and some of you (in fact, I guess the majority of you) have "learned" at some time in your life. In other words we infer that learning has taken place if an individual behaves, reacts, responds as a result of experience in a manner different from the way he formerly behaved. Changes in behavior which result from learning, by definition, exclude those changes which result from maturation or from physiologically induced changes arising from fatigue, illness, intoxication and similar pleasant and unpleasant organic experiences. So when we talk about learning theory we are trying to derive from the facts known about the changes in behavior resulting from experience, generalizations which enable us to make predictions concerning changing behavior by experience. The more accurately these generalizations describe the process by which experience changes behavior, the more useful will learning theory be in controlling the processes.

The central process in industrial training is learning. I am certain that the traditional man from Mars would not deduct this if he listened to training directors talking shop at conventions or weeping in each other's martinis about the lack of top management support for training activities. Very simply, industrial training consists in the organized experiences used to develop or modify knowledges, skills and attitudes of people involved in the production of goods and services.

What training directors are trying to do is to expose people in their companies to those types of experiences which will develop most effectively, or modify, knowledge, skills, and attitudes. Whether we are willing to admit it or not, the experiences to which we expose our employees are those which we believe and/or can convince management to believe, will expedite the learning process. In other words, on the basis of "our prior assumptions about a certain realm of events," we establish vestibule training or send a reluctant member of middle management to the Harvard Advanced Management Course. Some of us in doing these things also have some theory as to how experience modifies behavior.

The Professionals and Learning Theory. Now let us take a look at what the professionals in learning theory have to offer. These are the gents who are not concerned with top management support. They do not have to deal with foremen who have been "learning" men a long time before training directors became epidemic in industry. Certainly they have their problems with the "butcher, the baker, and the candlestick maker" even as you or I, but the pressures are different and their goals are different. So I think we should understand a few things about these professionals before we try to see how their efforts at learning theory are applicable to industrial training.

First, these men are trying to develop "scientific" theories, i.e., generalizations, which closely approximate the phenomena under consideration.

Consequently, they have had to adhere to procedures in their experiments which hold all variables constant except the experimental variable. This has resulted in too many reported studies which appear to the man who is trying to train weavers or mill wrights as almost puerile. Yet it is only by the careful addition of this bit of knowledge gained from studying the maze learning behavior of the white rats or of that bit from pursuit meter responses of college sophomores, that precise knowledge concerning learning is developed. This, of course, has led to a difficulty in applying these bits of knowledge to everyday problems of training. An experiment which demonstrates conclusively that white rats tend to repeat "rewarded" responses in learning on an elevated maze does not lead easily to the generalization that Rosie the Riveter responds in a similar manner as that of a lower order mammal. So the research, on which many theories of learning are based (since they deal with rats, chimpanzees, pre-school children, and college students) are not easily assimilated into the mores of the individual who must plan a training program to cut learning time for a group of operators assembling electrical relays or sewing seams on towels.

Second, the language used by learning theorists is esoteric and often (what is worse) mathematical. Again this is a penalty of their trade. Not only must generalizations be discovered but they must be stated also in unequivocal terms. Much of the English language is vague and pluralistic. Common words have multiple meanings and each hearer interprets in his own way. For example, Hull states "reaction-evocation potentiality is the product of a function of the habit strength multiplied by a function of the strength of the drive." [3] This can mean different things to different listeners. However, if the same principle can be expressed (as Hull does state it) ${}_{s}E_{r} = f({}_{s}H_{r}) \times f(D)$ and these symbols are substituted for mathematically, everyone understands precisely what Hull means. Or do they? Actually where common everyday concepts are used, considerable misinterpretations arise. Thorndike, for example, reviewed the old hedonistic controversy with his law of effect by using the everyday terms like "satisfaction" and "annoyance." It is unfortunate that the necessity for exactness in terminology has obscured (except to the initiated) the general principles of learning postulated by leading theorists like Hull and Tolman.

Finally, these searchers after fundamental truths are human, even as you and I. They bring to their search for underlying principles their own predispositions and they become enmeshed in their own theories. Accordingly not only do they interpret the results of their experiments in terms of their theoretical orientation, they also design experiments which serve to test their theories in terms of their theoretical orientation. Again the

[3] Clark L. Hall, *Principles of Behavior* (New York: D. Appleton-Century Company, 1943), p. 242.

hypothetical man from Mars, provided he was a non-connectionist, non-reinforcement theorist, and non-Gestalter, could find definite evidence to support each of these theories in the famous study of the learning of simians reported by Kohler. The dispute among theorists concerning the learning process has increased the confusion of the layman without an appreciable gain in controlling the process.

Generalizations Concerning Learning for Industrial Training. It is not possible, even if I could, in this article to present the subtleties of the major modern learning theories including among others Thorndike's connectionism, Hull's reinforcement theory, Lewin's topological psychology or Tolman's sign Gestalt theory. Rather on the basis of what these investigators and many others have learned about learning, I am going to try to make a few simple declarative statements about learning and then try to indicate their implications for industrial training. In trying to write these sentences I must acknowledge my indebtedness to certain individuals who have tried to synthesize the major concepts from various learning theories including J. F. Dashiell,[4] D. K. Adams,[5] T. R. McConnell,[6] Ernest Hilgard,[7] and Lee Cronbach.[8] They, however, should not be made to accept any criticism for my synthesis of their syntheses.

From this attempt to synthesize, the following generalizations concerning the learning process have evolved. They may be considered a statement of "what happens" when an individual learns. They can serve as guide-posts for ordering experiences planned to modify behavior, i.e., train the individual. I shall leave it to you to judge how nearly they describe learning. Later I want to cite their implications for industrial training. These statements are:

The learner has a goal or goals, i.e., he wants something.

The learner makes a response, i.e., he does something to attain what he wants.

The responses, which he makes initially and continues to make in trying to attain what he wants, are limited by:

The sum total of his past responses and his abilities.

His interpretation of the goal situation.

The feed-back from his responses, i.e., the consequences of his response.

[4] J. F. Dashiell, "A Survey and Synthesis of Learning Theories," *Psychological Bulletin*, 1932, pp. 261–75.

[5] D. K. Adams, "A Restatement of the Problem of Learning," *British Journal of Psychology*, Vol. 22, 1931, pp. 150–78.

[6] T. R. McConnell, "Reconciliation of Learning Theories," *National Society for Studies in Education*, 41st Yearbook, Part II, pp. 243–86.

[7] Ernest R. Hilgard, *Theories of Learning* (New York: Appleton-Century-Crofts, Inc., 1948).

[8] Lee Cronbach, *Educational Psychology* (New York: Harcourt, Brace & Co., Inc., 1953), p. 617.

The learner, having achieved his goal (or goal substitute), can make responses which prior to his goal seeking he could not make. He has learned.

Implications of Generalizations for Industrial Training. You at this point might easily say "so what." If this is an accurate description of learning, what are its implications for training in industry? As I have indicated, a theory gives the theorist a way to think about his phenomena. It can give him suggestions for predicting and for controlling the phenomena with which he is concerned. Now let us see what thinking about learning as outlined in my declarative sentences leads to in planning and directing industrial training activities.

First, I have postulated that if learning occurs the learner has a goal, i.e., he wants something. Now goals can be many kinds—they can be short ranged or long ranged; they can be clearly thought out and verbalized or vague and subverbal. The question I raise here is just how much thought is given in planning any training program to the goals of the individuals who are to be trained. If you are planning training for a production worker, are his goals your goals? I imagine quite different outcomes of training would result if the employee accepted as his goal the production of the maximum units of a given quality in a given time (industry's goal) rather than accepting work group goals of producing enough to keep the foreman off his neck and the time study man from cutting his rate. What also of the training programs designed to improve the human relations behavior of foremen when the foreman's goal is to please a superior whose only concern is costs and units produced.

A recent study [9] gives a clear example of modifying goals which resulted in a significant change in the performance of a group of four operators. These four operators were rewinding bobbins from a spinning frame. In this salvage operation they produced waste at a ratio of 2.50 per week above standard. Methods were used with these operators to change their goal from rewinding so many bobbins a day to rewinding so many bobbins in such a way as to minimize waste. Within a 15 week period of training, these operators learned to handle bobbins in such a way that the waste was reduced to .87 of standard. The reduction with slight variation has persisted for over two years in this operation.[10] This represents a considerable savings in material in two years by careful attention to the goals of four operators. There was no decrease in amount of production during this period.

[9] W. McGehee and D. H. Livingstone, "Training Reduces Material Waste," *Personnel Psychology,* Vol. **5,** 1952, pp. 115–23. [Editor's note: The reader needs to know that the jobs of operators, loopers, and setters, to which McGehee refers, are in a textile mill (Fieldcrest Mills).]

[10] W. McGehee and D. H. Livingstone, "Persistence of the Effects of Training Employees to Reduce Waste," *Personnel Psychology,* Vol. **7,** 1954, pp. 33–39.

My second postulate is that the learner makes a response, i.e., he does something to attain his goal or goals. In learning rote verbal material or motor skills, we call this "practice"; perhaps in learning facts and developing attitudes and sentiments, we call this "experience."

One of the immediate consequences of accepting this postulate concerning learning is to acknowledge that effective industrial training must make provision for the learner to make a response. Training programs which emphasize elaborate visual aids, demonstrations, clever lectures, and similar devices for inducing learning at the price of learner activity become immediately suspect as to their effectiveness.

The second problem this postulate creates is the question as to whether all responses, "practice or experience," are equally valuable in the goal seeking activity of the learner. Fortunately, the learning theorists have gotten a reasonably clear answer to this question and the answer is "No." Certain valid statements can be made concerning the conditions necessary for effective practice and experience. The following are a few of these statements:

1. The more nearly responses made in a learning situation are those which an individual must make in "playing for keeps" the more quickly he'll learn to play for keeps effectively. For example, if both speed and accuracy are required to perform a task, the learner should be urged to make responses characterized by both speed and accuracy.

2. The order in which various responses are made in learning a task will facilitate or retard effective completion of the task at some subsequent time. If two responses to the similar situations are practiced before either response is firmly established, the situation may call out either one of these responses—one adequate and the other inadequate.

3. Immediate knowledge of the results of a response tends to correct the response most effectively. This was demonstrated in World War I by English's experiment in training rifle shooters and again in several situations in World War II in training radar operators, teaching code, and training operators of direction finders.[11] Lindahl's study in industry on cutting discs substantiates the same conclusion.[12] In spite of these results, very few industrial training programs provide for this feature of immediate knowledge of result.

4. Spacing of practice is extremely important. Again laboratory studies, while differing in details as to the application of this principle, have shown generally that spacing practice sessions results in more efficient learning. We have been able to demonstrate the value of spaced practice in learning several repetitive operations such as spinning and sewing machine

[11] Dael Wolfle, "Training," in S. S. Stevens, *Handbook of Experimental Psychology* (New York: John Wiley & Sons, Inc., 1951), pp. 1, 267–86.

[12] L. C. Lindahl, "Movement Analysis as an Industrial Training Method," *Journal of Applied Psychology,* Vol. **29,** 1945, pp. 420–36.

operation. The major industrial objection to spaced practice is that the learner is at work for 8 hours a day and should be kept busy. Ingenious trainers, in spite of the 8-hour day, still can arrange for spaced practice. In this connection, I have wondered about the intensive training sessions which characterize many training programs for supervisors and managers. Could spacing these sessions result in more effective learning?

I could cite other points which have emerged from the investigations of the nature of practice and its effectiveness. You are as familiar with them as I am. What I want to stress again is that if we accept "responses" as an integral part of learning, we immediately start asking questions about the necessary conditions for these responses to result in the most effective learning.

I would like to repeat my third postulate here since it is more involved verbally than either of the other two: What I have said is that the responses made by a learner in a goal situation are limited both initially and as he continues in the goal situation. I then stated there exist three general classes of limitations. Let us expand about the first limitation. I have said a learner cannot make a response to a goal situation which is not already in his repertoire of responses or is beyond his abilities.

Let me illustrate this by one example in foreman training since I believe the point is overlooked frequently in training designed to modify behavior of supervisors. Many of us, I expect, have sponsored so-called "appreciation" courses in time study for foremen. We hope with these courses to secure the wholehearted support of our supervisors in our methods and standard work. We are disappointed if the same buck passing and lack of appreciation of the value of time study continues in our foremen group after completion of the course. Now time study is a relatively complex discipline. Telling people about time study does not equip them with knowledge and skills required to answer employee questions about rates or to discuss intelligently, with time study engineers, proposed rates. Lacking the knowledge and skill required, the foreman is put in an impossible position. He cannot make the responses required because they are not in the sum total of his past responses and abilities.

In designing a course in time study for our supervisors, we give full consideration to the limitation. We designed and exposed a group of our foremen to a course in time study which gave them competence in, rather than appreciation of, time study. We compared their improvement in: (1) knowledge of time study; (2) handling of time study activities in their department both before and after the course with a matched group of foremen who did not take the course. The trained group showed 26.3% gain in knowledge compared to no change by the untrained group. What is even more important, the trained group showed 42.1% improvement in handling of time study in their department versus a 9% (non-

significant) gain for the untrained group. I must add that in both groups each foreman had had at least 10 years experience with time study in his department. Each foreman had had at least one "appreciation" course in time study and several had had two or three such courses.[13]

The second limitation to responses is imposed by the learner's interpretation of the goal situation. We found that loopers who were urged to work "carefully" failed to develop speed. We found that battery hands who were allowed to fill batteries using only two bobbins rarely "pick up" a more effective method of handling 4 or 5 bobbins. They saw the situation as fill the batteries with 2 bobbins, not fill the battery efficiently. Further, in human relations training, we may find the interpretation of the course as a method of manipulating people more easily, not as instruction in how to perceive people differently. The supervisor then learns certain superficial skills but fails to experience basic changes in attitudes toward human relations problems. Operators who interpret methods improvements as threats to job security react in a different manner from those who interpret methods improvements as aids to company and employee progress. Finally, in training in a rather complex job called setting, we found learners developed skills more rapidly when they were urged to visualize the pattern in terms of several strands of yarn rather than reacting to each square on the pattern as an individual strand.

A third limitation placed on responses is the feed-back the learner gets from making the responses. This is clearly illustrated in a skill like playing the piano or driving a golf ball or fly casting. Both visual, auditory, and kinesthetic cues "tell" the performer when the response feels right or wrong. The feed-back which tells the learner that the response is not goal directed encourages him to try some other response; while the response which "feels" good tends to be used again and again.

This limitation points up one practical consideration in industrial training, i.e., the importance of the instructor in the learning situation. It is the instructor who can analyze the adequacy of responses and serve as an effective "feed-back" device for correction of responses. If there is one thing that is known about industrial training, it is that organized training is more effective than unorganized training. I suspect the reason is that organized training provides a more effective feed-back.

My fourth declarative sentence really says that the individual has learned. In other words, he is capable of making responses which he could not make prior to wanting something and responding. It does, however, point up the fact that the process called learning produces responses which can be classified both as adequate and inadequate. Erroneous information, poor skills, and undesirable attitudes are just as much a product of learning as are correct information, effective skills

[13] W. McGehee and J. E. Gardner, "Supervisory Training and Attitude Change," *Personnel Psychology*, Vol. 8, 1955, pp. 449–60.

and desirable attitudes. From a practical standpoint, this means that we must continually evaluate the results of placing employees in learning situations. We need to know what facilitates and what retards practice. Many techniques used in modern training such as visual aids in training devices have "face validity," i.e., they look good. Actually such aids to training may not facilitate and may even retard learning. It is entirely possible, for example, that the case study method of training executives may increase the elegance with which a problem is approached but have absolutely no effect upon the quality of the solution.

Learning Theory and Industrial Training. These, then, are some aspects of learning theory in relationship to industrial training as I see them. One more sentence or two. A fully adequate theory of learning will not emerge from the animal laboratories and the classroom. These theories must hold also in the factory and the office. Likewise, learning experience in the factory and office should give cues for laboratory investigations. I would plead therefore for more and more interchange between the learning theorist and the industrial trainer. This cohabitation will aid in giving both "freedom from the swirling events" surrounding the problems of learning and training.

6. Persistence of the Effects of Training Employees to Reduce Waste *

William McGehee
Dwight H. Livingstone

SUMMARY

There exists little or no information in regard to the long-term effect on employee behavior of training designed to modify overt behavior through modifying attitudes. A previous study (5) has shown that a training program designed to modify employees' attitudes toward waste in a textile process was followed by 61.6 per cent reduction in waste. This reduction took place over a period of 29 weeks.

The present study has investigated the persistence of the effect of this training program over a period of two years subsequent to the initial

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period of 29 weeks. During the first 80 weeks of this two-year period the reduction in waste persisted at the same level as that reported for the previous 29-week period. During this time the operators were given no further training in waste reduction.

At the end of the 80-week period the waste reduction training program was repeated. A further reduction of 45.3 percent in waste was secured during the 26-week period subsequent to the retraining program.

It is concluded that a training program following certain basic principles of employee relations will result in changes in employee behavior which persist over a relatively long period of time.

The Problem. There exists little or no information in regard to the long-term effect on employee behavior of training designed to modify overt behavior through modifying attitudes. Coch and French (1) in their study of overcoming resistance to change followed up the effects of their program for 32 days. Bavelas (4) reports a 13-week follow-up on a study of group decision making in setting production goals. Levine and Butler (2) give no evidence of the persistence of the change in rating factory workers by supervisors resulting from "group decision" vs. "lecture" training. McGehee and Livingstone (5) report a 14-week follow-up period of a training program designed to reduce waste.

Lewin (3), however, has pointed out that changing group behavior involves not only "unfreezing" and "moving" but also "freezing" the new behavior at a new level. He further indicates that changes in behavior of the kind discussed here are often short-lived and that after the initial "shot in the arm," the behavior of the group soon reverts to its previous level.

The present study is an investigation of the "long-term" effects of a training program designed to secure employee interest and cooperation in reducing waste. The concept "long term" is naturally relative. It is used here to cover a period of over two years. It is "long term" in the sense that the period covered extends over a much greater time span than has been reported in the majority of investigations of the modification of employee behavior.

The Investigation. McGehee and Livingstone (5) reported reduction in waste in a textile operation known as "tailing" as the result of a training program designed to modify the behavior of four operators. The procedures used are described in detail in the article cited above. The basic steps of the program were:

1. Presenting information to the operators concerning the need for waste reduction.
2. Giving the operators instruction in procedures for doing a better salvage operation of the materials used by them.
3. Keeping the operators informed by graphic devices about the results of their efforts to reduce waste.

This program resulted in 61.6 per cent reduction of waste during the 29 weeks in which the program was initiated and followed up by the investigators in comparison with a previous period of 10 weeks.

Waste records on this same operation have been kept for a period of 106 weeks subsequent to the time specified above. During 80 of the 106 weeks no reinforcement of training other than normal supervision of the job was given. The operators continued to know generally the waste figures on their operation, but no special emphasis was placed on these figures. During this 80-week period, there occurred no significant changes in machinery, methods, or materials used in the operation. Supervisory personnel remained the same; three out of four of the original operators were on the job throughout the entire period.

At the beginning of the last 26-week period in the 106 weeks of this record, a second campaign to reduce waste following much of the lines of the original training program was begun with this operation. This was a part of a total mill and company program to reduce waste in all departments. Some consideration was given to omitting the tailing operations from the program in view of the earlier training. As will be indicated later, it was fortunate that this decision was not made.

In order to determine whether or not the change in behavior recorded in the 29 weeks in the previous study (5) persisted, waste ratios for each of 106 subsequent weeks were computed. The average waste ratio for each 20-week period during the first 80 weeks was computed as well as for the last 26 weeks of the study. This ratio is the ratio of actual waste to standard waste allowed for the operation. The following section gives the results of these computations.

Results. Table 1 shows the average waste ratios for the periods in the earlier 29-week time span and for the subsequent 106 weeks.

There is a significant reduction in waste ratio between the pretraining period, the initial training period and follow-up, and the subsequent 106-week period of follow-up. No significant differences are found between the period of initial training and follow-up and the subsequent follow-up periods of 60 and 80 weeks.

There is, however, a significant difference between the initial training and follow-up period and the final 26 weeks of follow-up as well as between the initial period and the fourth 20-week period of the follow-up. The first of these differences is explicable since at the beginning of the 26-week period a renewal of the program to reduce waste was introduced in this department.

The difference between the initial period and the fourth 20-week period in the follow-up can not be explained in terms of the data available. Since no planned changes in methods, materials, or machinery occurred in this period, we can offer only one explanation of the significant difference. The overall program of waste reduction in this mill and throughout the

Table 1. Means and Standard Deviations of Waste Ratios for Specified Periods

	Periods and Period Numbers											
		Initial Training and Follow-up				Present Follow-up						
	1 Pre-Training	2 Training	3 Re-in-forcement	4 Post Training	2–4 Total 29 Weeks	5 1st 20 Weeks	6 2nd 20 Weeks	7 3rd 20 Weeks	8 4th 20 Weeks	5–7 Total 60 Weeks	5–8 Total 80 Weeks	9 Final 26 Weeks
Mean . .	2.50	1.50	.87	.94	.96	1.05	1.03	1.01	.71	1.03	.95	.52
S.D. . . .	.42	.45	.06	.16	.24	.17	.15	.19	.31	.17	.28	.07
No. weeks	10	3	12	14	29	20	20	20	20	60	80	26

company was begun at the start of this period. This program was publicized and well-known throughout the organization. It is possible that the general waste reduction program had a "spill-over" effect on the tailing operation. Both operators and supervisors without formal urging probably began to pay more attention to waste reduction. This may have resulted in the reduction found in this 20-week period prior to reintroduction of the formal waste program in this operation.

Discussion. As in the previously reported study (5) this investigation lacks the exactness found in experimental studies which have control groups. However, the factors which might influence changes in waste ratios other than continuation of operator effort engendered by the waste reduction program have been investigated. No significant changes have occurred in these factors which would account for the results reported here.

We have investigated also the waste ratios for similar tailing machine operations in three other cotton mills in the organization. No significant changes in these waste ratios occurred either during the first 29 weeks reported in this study or in the first 80 weeks of the subsequent 106 weeks of follow-up. During the last 26 weeks, the waste reduction program was introduced in the other departments with comparable reductions in waste.

We, therefore, believe the data given here offer evidence that a carefully planned program to modify employee attitudes and action toward a specific production problem carries beyond the initial training period for a considerable period of time. In this instance, behavior modification lasted for a period of 94 weeks subsequent to the initial modification, i.e. 14 weeks of the initial follow-up plus the subsequent 80 weeks prior to retraining.

There is evidence also that when considerable improvement has been obtained in waste reduction and this improvement has persisted over a period of time, reinforcement will result in still further improvement. A reduction of 45.3 percent in waste ratios was secured in a subsequent 26-week period when a formal training program to reduce waste was reintroduced in the tailing operation.

Statistical Section. Means and standard deviations for each period in this investigation were computed and are shown in Table 1. Table 2 gives the differences in waste ratios between specified periods and *t*-values of these differences.

The data in this table substantiate statistically the conclusions that a program to modify employees' attitude and action toward a specific production problem is effective both on a short term and a relatively long term basis. It is the opinion of the authors, as expressed earlier (5, p. 121) that the basic principles underlying the success of this program are:

1. Presenting frankly, fully, and sincerely the reasons for any change to all who will be affected by it.

TABLE 2. DIFFERENCES (D) IN WASTE RATIOS AND *t*'s (*t*'s except as indicated, significant at the 1% level)

	Initial Training and Follow-up 29 weeks		Present Follow-up							
			60 weeks		80 weeks		4th 20 Weeks		Last 26 Weeks	
	2–4		5–7		5–8		8		9	
	D	*t*	D	*t*	D	*t*	D	*t*	D	*t*
Pre-training (1)	1.00	3.35	1.47	14.13	1.55	16.67	1.79	14.09	1.98	26.76
Initial follow-up (2–4)			.07	1.59 *	.01	.31 *	.25	3.16	.44	8.98
60 weeks (5–7)					.08	2.11 †	.32	5.82	.51	15.00
80 weeks (5–8)									.43	8.60
4th 20 weeks (8)									.19	3.02

* Not statistically significant.

† Significant at 2% and 5% levels of confidence.

2. Enlisting participation, at their level of competence, of individuals involved in the plan by assigning them specific tasks to perform.

3. Keeping the individuals involved informed concerning the outcomes of the project. This is the old principle of the knowledge of results.

4. Special recognition of individual workers assists in a program such as this. There are, however, limits to which special recognition can go. If the above three principles are followed, special recognition merely accentuates the process and its withdrawal does not cause a reversal to the condition existing before such a plan was inaugurated.

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Part Five: EVALUATION OF JOB PERFORMANCE

1. Six Merit Rating Systems *

Joseph Tiffin

Merit rating is simply a systematic way for a supervisor to record his judgment about the job-performance of an employee. It is new only in the sense that it involves a record of the judgment made. Unrecorded ratings of employees by supervisors have been made ever since one man worked for another. And these unrecorded judgments have often played an important part in the future of the man rated.

Before discussing merit rating methods and their value, let us consider very briefly some of the basic purposes that ratings are intended to serve. First, they are used to identify men for promotion or wage increases. In one instance, rated merit was given a weight of 20% among several factors. Sometimes a second purpose is to identify men who can be transferred to other jobs advantageously. A third often is to show in what directions an employee can improve or "develop" himself; the resulting counseling interview helps the man see what he can do to better his performance. A fourth purpose is to check on the effectiveness of employment selection tests; people may be tested when hired, and merit rating used later to see how well the tests predicted their actual performance. A fifth seldom used purpose is to identify men for layoff, where seniority is not the sole criterion.

With these five possible purposes of merit rating in mind, let us take a look at some of the basic types of merit rating plans. As we look at the different plans, it will be apparent that some work much better than others in accomplishing the different purposes. This is understandable because the different plans were developed by different men or companies, each having one particular purpose more or less in mind when the plan was developed or installed. I say "more or less in mind" because far too many rating plans have been installed without much, if any, careful consideration by top management of the particular results they expect the plan to accomplish.

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All rating plans seem to fall into one of six categories. The most widely used makes use of a graphic rating scale on several different employee characteristics. The employee is rated by his supervisor separately on each factor. The factors vary from company to company, depending on what characteristics the management of the company feels are most important. When 18 different chart-forms were gathered from 18 companies using this kind of plan, a total of 35 different characteristics were included. One company was rating on 21 characteristics.

The "Halo" Effect in Rating. In using a graphic chart system, it is customary to add the ratings given to each man on all of the traits used. This results in a single over-all rating for the man in question. Several weaknesses of the method have been discovered by statistical analysis of many installations of this type. One of these weaknesses centers around what has been called the "halo" effect—the tendency of a rater to rate a man high or low in every respect because he knows (or thinks) the man is high or low in one particular respect. The result of the "halo" effect is that ratings on ten or twelve different traits do not actually result in ten or twelve different ratings at all—but simply ten or twelve repetitions of essentially one rating of the man.

Consider Raters' Tendencies. Another weakness of this method is that a rater's tendency may result in placing all of the men that he rates very high on the scales, if he is a lenient rater, or he may place all of the men he rates very low if he is a "hard-boiled" rater. Thus, when the ratings of different men are being compared, the raters' tendencies must be considered.

Aside from raters' tendencies, it is often found that most men on fairly *high-level* jobs are rated higher than most men on other fairly *low-level* jobs. Other variables which may have a systematic influence are such things as the department in which the men are working, and the service or age of the employees. The extent to which such variables are influencing the ratings should be determined and allowances made for them when ratings of this sort are used for any purpose.

One steel company with which the writer has had contact for some time has had a plan of this sort in operation for over 15 years. Corrections are made for raters' tendencies by determining the average rating given by each supervisor to all of the men he rates. If this average turns out to be 65, five points are added to each of the ratings this rater has made, thus putting his average rating at 70. If another supervisor turns in ratings on his men that average out to 75, five points are subtracted from each of the ratings this rater has made, thus giving his ratings also an average of 70. The ratings turned in by every supervisor are corrected in this way. Since swing shifts are used, every man is independently rated by at least three and often by as many as six different supervisors.

A second basic method of rating is the simple process of having each

supervisor rank from highest to lowest all of the men reporting to him. This is ordinarily done on the basis of over-all job performance, though if desired it can be done by each supervisor several different times on characteristics that are considered by the company to be important.

Employee Comparison Rating. A third method of rating is called the employee comparison system. With this plan, all employees reporting to a given supervisor are arranged into pairs, each man being paired with every other one. The pairs of names are assembled into a small booklet and the supervisor goes through the booklet, looks at each pair of names, and checks the man in each pair who is better in over-all job performance. If more than 25 men are to be rated by one supervisor, this method becomes unwieldy because of the excessive number of pairs he must go over. With N men, the number of pairs is equal to $\frac{N\,(N-1)}{2}$. Thus with 25 men to be rated, the number of pairs is 300. While even this number might seem excessive, a supervisor can go through 90% of the pairs very rapidly and check one or the other in a second or two. The average supervisor can check 300 pairs of names in not over 15 minutes.

Time and time again this method of rating has shown greater agreement between different supervisors rating the same men than any other rating system we have used. However, the uses that may be made of such ratings are very limited. Obviously, they cannot be used for promotional purposes because the system does not show a man rated low *why* he was rated low. For the same reason, it cannot be used for counseling, employee improvement, transfer, and certainly not for layoff. These facts limit the usefulness of this method to checking on the value of employee selection procedures. For this purpose, it has been found to be highly satisfactory.

The Forced Distribution System. A fourth method is known as the forced distribution system. Here again the raters rate the men on over-all job performance. With this method the name of each man reporting to a supervisor is typed on a 3″ x 5″ card. The rater is then asked to stack all cards into one of five piles which are labeled *Low, Low Average, Average, High Average,* and *High.* He is further requested to follow as well as he can a distribution of the cards into the five piles so that 10% of the men are rated low, 20% low average, 40% average, 20% high average, and 10% high. He thus forces the distribution and avoids piling up most men at the high or the low end of the scale. This method also shows quite high agreement when different raters rate the same group of men.

The above four methods were all fairly well developed prior to World War II. Because of the obvious limitations of each, the military during the war set out to develop some newer and, it was hoped, better methods. The military research went in two directions. The Army set up a research program under the direction of Col. M. W. Richardson. Richard-

son and his co-workers developed what came to be known as the forced-choice method of rating. Do not confuse the phrase *forced-choice* with *forced distribution.*

The Forced-Choice Method. The forced-choice method requires a very great deal of preliminary work in developing the scale. This work involves finding many pairs of statements about job performance of men, the members of each pair of statements expressing equally favorable or equally unfavorable things about a man, but only one of the statements in each pair actually differentiating between the men known to differ in job performance. The statements are then printed on the rating form in groups of four—two of the four statements are favorable (and equally favorable) and the remaining two are unfavorable (and equally unfavorable). The rater is asked to check two of the four statements—the one that *most* and the one that *least* describes the man being rated.

The idea behind this plan is that a rater attempting (consciously or unconsciously) to rate a man higher than the man's true worth has no way to decide which of the favorable alternatives to check. Since only the previously determined discriminating statements are scored, and since the difference between these and the other favorable statements is not apparent, it was found to be far more difficult for a rater to bias his results than could be done with other types of rating plans.

However the plan never got very far in actual operation, probably for three reasons: 1. It is very expensive to construct. 2. The name of the scale, Forced-Choice, turned out to be a red flag to the officers who were asked to use the scale. 3. It was impossible to keep the keys secret.

Critical Incidents Rating System. The last method I should like to discuss also had its origin during the war as a part of the personnel research activities of the Air Force. This plan is known as the Critical Incidents Rating System. It was developed primarily under the direction of Col. John Flanagan. The plan consists of determining from extensive interviews with officers on the job, things actually observed by them of flyers *doing* or *failing to do* something that was critical to the success or failure of a mission. Once such a list of critical incidents had been compiled, the supervising officers were asked to watch for these and similar instances of such critical incidents in the behavior of the men under their command.

The rating of a man is then made from a compilation of such incidents that have been noted and recorded about his job performance. If a considerable number of Good Critical Incidents has been noted about a man during a given period on the job and few negative critical incidents have been observed, the man's rating would be high. Conversely, if most of the incidents noted about a man have been negative, his rating would be low.

An obvious strength of the critical incidents method of rating is that the rating is based upon things actually observed, rather than upon what-

ever the rater happens to remember when he makes the rating by some other method. And it is a part of this method that the incident be recorded when observed, and discussed with the man at the time of recording. If this is done, and some action based on the rating is taken at a later time, there is far less likelihood of the man feeling that he has been dealt with unfairly.

Several industrial installations of critical incidents rating plans have been made. The use of the plan in these installations is essentially limited to employee improvement and bettering the relationship between worker and supervisor, rather than for any of the other purposes mentioned earlier.

How Select Merit Rating Plan? Now that we have considered some five basic purposes that merit rating has at times been expected to serve, and have looked at six different types of merit rating plans, the obvious question is which method should be used. First, decide what is paramount. Taking a fairly simple purpose first, if your main object is to set up a measure of job performance for the purpose of checking on the adequacy of your employment methods, the employee comparison system is the method you should use. When checking on employment methods is your basic purpose, you don't need to explain ratings to the men rated. In fact, the men don't ever need to know they have been rated.

If your basic purpose is promotion or transfer, I recommend a chart system supplemented by a plan for recording critical incidents. Ratings with the chart should be made independently by at least three different raters, the ratings made by each should be corrected for raters' tendencies, and the average corrected rating of each employee should then be computed. But critical incidents of on-the-job behavior should also be noted and recorded. Then when action regarding an employee is taken on the basis of his average corrected rating, records of critical incidents will be available to justify the action taken.

This combination of methods is exactly what is now being used at the steel company mentioned earlier. When the critical incidents phase was inaugurated about two years ago, supervisors were asked to mention actual things they had seen men *do* or *fail to do* that were critical to job success in the mill. The supervisors supplied past incidents they had observed under each of the major categories that appear on the Merit Rating Chart.

Examples of Critical Incidents. Under *Accuracy of Work* they mentioned as favorable incidents such things as: 1. Applied job knowledge on new or difficult work; 2. Produced good product under adverse conditions.

Under this same category, they mentioned as unfavorable incidents such things as: 1. Failed to check and inspect work; 2. Failed to follow instructions; 3. Failed to use proper tools or machinery.

Under the category *Quality of Work,* the supervisors mentioned such favorable incidents as: 1. Found a better way of doing the job; 2. Maintained high production under adverse conditions.

Under the category they mentioned such unfavorable incidents as: 1. Planned work poorly; 2. Failed to instruct crew correctly.

In a series of supervisory conferences, typical good and bad incidents under each of the ten characteristics used on the chart were mentioned. These incident descriptions were edited, duplications removed, and printed on sheets under the ten categories for distribution to all foremen in the mill. From that time on, foremen began noting and recording critical incidents of on-the-job behavior. These records have been found essential in later use of the rating plan in connection with promotions and upgrading.

Of course this dual system involves twice as much work for supervisors as would be the case if only one of the plans were used. In the hope of being able to eliminate the chart part of the plan, we have been working with this company in an attempt to develop a method of ranking the men from the incidents alone. While the work along this line is not finished, certain preliminary results would seem to indicate that reliable rating lists can be prepared if as many as seven incidents per man are recorded over a six-month period.

2. Some New Directions in Personnel Appraisal *

Wallace H. Best

A recent cartoon portrays an employee admonishing his boss as follows: "May I remind you, sir, that we are talking about a raise, not my work!" Here is an apt illustration—unflattering as it may be—of some of the problems that are likely to arise in administering an employee rating system.

The truth of the matter is, of course, that the employee may be right! Perhaps he has no reason to believe that an increase in pay has any connection with his work performance. Perhaps, in this case, there should

* This article has been adapted from an address before the Personnel Testing Council of Los Angeles, May 1, 1957. It is reprinted from *Personnel,* 1957, 34, #2, 45–50, by permission of the author, the American Management Association, Inc., and the Personnel Testing Council of Los Angeles.

not be any connection. If his company, like so many others, has failed to develop a satisfactory rating system, the employee can scarcely be expected to understand the purposes of rating or accept its results.

Many of the difficulties encountered in developing and applying performance appraisals arise from contradictions inherent in the rating process itself. Even the words employed to describe the process reflect these contradictions.

The term "personnel," for example, as used in the rating context, has traditionally implied a subordinate mass being evaluated by hierarchical superiors. For our purposes, however, let us think of "personnel" as embracing *all members of an organization without regard to status or prestige.* The term "performance" can then be extended to *any aspect of human behavior on the job.*

As for the term "rating," it applies to *areas of judgment which are not susceptible to the testing process.* In other words, a rating is a judgment, whereas a test ought to be a measure. In reality, of course, there is no distinct boundary line but rather a shifting zone where rating and testing coincide. Nonetheless, insofar as a thing can be tested, it should not be rated. As testing becomes a more exact science, the sphere of rating will probably contract—though we may note in passing how often tests are validated by a rating criterion.

Essentially, rating is a composite of substance and feeling, and these elements are not separable. While ratings may be *systematized,* they cannot be objectified because the rating process is inherently *subjective.* Taking "interpersonal agreement" as a criterion of objectivity, for example,[1] how can rating be objective when differences between rater and ratee—psychological and social distance, relative positions in the hierarchy, and so on—make any agreement most unlikely?

Furthermore, let us put to rest the myth that ratings *measure* "merit." Rather they *portray* the pattern of interpersonal perceptions at a fixed point in time; if repeated, they also reveal trends. Whether or not these patterns and trends are accurate indicators of "merit"—and this is an open question—certainly they do not *measure* it.

Nevertheless, it must be recognized that despite its subjective character, the rating process is a fundamental reality in the lives of individuals and groups. It is a critical element in success, personal or organizational, and, reflecting as it does the interaction of individual and group interests, it is inevitably interwoven with power politics.

But if ratings are such ambiguous and awkward instruments, why use them at all? Primarily because we have no choice! Rating is an inescapable and indispensable feature of personnel administration. If formal meth-

[1] J. P. Guilford, *Psychometric Methods,* McGraw-Hill Book Company, Inc., New York, 1954.

ods are not provided, or if they are inappropriate, ratings will be made *informally.*

Traditional Features of Rating Systems. Looking back upon the rating systems that have been employed in the past, we find that they may be classified for the most part as (1) authoritarian, (2) punitive, (3) perfunctory, (4) complex, and (5) nonfunctional.

Rating systems have been authoritarian insofar as they were imposed by higher authority upon rater and ratee alike with little or no regard for the psychological or social consequences of the process. Ratings have been punitive in the sense that they represented a direct threat to the security of those subject to process. At the same time, ratings have often been *perfunctory* because they were not regarded as a serious matter by those who had authority to establish or administer them. Consider how many rating forms have been duly completed, filed—and then forgotten! Moreover, many rating systems have been unduly complex because of long lists of traits, extreme ranges of discrimination, and involved scoring. And finally, they have all too often been adopted merely for the sake of getting on the bandwagon or imitating a particular competitor—in short, they have been conspicuously *nonfunctional.*

To an encouraging extent, however, these mistakes belong to the past. The present is, significantly, a period of transition. There is today a growing recognition of "what ratings do *to* people," [2] a greater awareness of the fact that extending the list of traits does not assure better appraisals,[3] and wider acceptance of such concepts as Lawrence Appley's "multiple evaluation" and "open evaluation." [4] There is also an increasing and wholesome skepticism, as evidenced in the conflict between those who advocate the compulsory post-appraisal interview and those who question it.[5]

If we ask, *what will ratings be like in the future?,* the answer is that we do not really know. But does this matter?

To borrow an analogy from another field, the mirror image theory in nuclear physics was apparently disproved just this year—but a physics operating on the basis of this theory was capable of creating fission and

[2] A. S. Glickman, "Effects of Negatively Skewed Ratings on Motivations of the Rated," *Personnel Psychology,* Vol. 8, No. 1 (Spring, 1955), p. 41.

[3] J. Tiffin, "Merit Rating: Its Validity and Techniques," in M. J. Dooher and Vivienne Marquis, eds., *Rating Employee and Supervisory Performance,* American Management Association, New York, 1950, p. 17 ff.

[4] L. A. Appley, *Executive Practices in the Field of Human Relations,* Industrial Relations Section, California Institute of Technology, Bulletin No. 12, 1946, p. 17.

[5] S. J. Hayden, "Getting Better Results from Post-appraisal Interviews," *Personnel,* May 1955, pp. 541–550.

fusion bombs.[6] Fifteen years ago, hardly a dozen subparticles of the atom had been hypothesized, much less identified, whereas today the running hypothesis envisages some thirty subparticles. Like the voyage of Columbus, the launching of the Manhattan Project has led to the discovery of vast and heretofore unimagined continents. Surely new horizons lie ahead in human relations too, though we may only guess at them today.

New Ideas. If the possibilities in this field are to be realized, however, some of our current thought patterns may have to be revised.

As Poul Anderson has suggested, the cultural possibilities of any science are conditioned by the way in which the structure of language channels ideas.[7] In Western society, he alleges, we are too prone to segregate cause and effect and to impose traditional methods of analysis and interpretation on new avenues of thought. From this point of view, we may well ask whether the social sciences, particularly psychology, are not too enamored of the methodologies evolved by the natural sciences and whether the fixation upon measurement as a requirement of "real" social science is not excessive.

For my own part, while I have great respect for those who devote their time and energy to developing a psychometric science, I cannot accept them as the only genuine personnel experimentalists. It is true that their sensitivity to the need for rigorous research standards has made a notable contribution to our knowledge of ratings. At the same time, however, I suspect that this very quality tends to insulate them from the pragmatic insights that the administrator, line or staff, may experience.

Take for example the normal distribution concept. Is this either a useful or a valid tool in the analysis of the rating process? Or is there another and more significant construct with which we should be concerned, namely, the aggregate of distinctly individual profiles pieced together from many different viewpoints?

Looking Ahead. Since these and other questions have yet to be explored, any predictions about the future must be highly tentative. Nevertheless, certain lines of development may be anticipated.

It is likely, for example, that performance rating will become more rather than less subjective as those who control the process come to realize its inherent nature and become less anxious to ape the research methods of older sciences. From this trend we may expect to see:

1. The use of fewer and broader traits.
2. Simpler trait scaling.
3. Abandonment of a summary score and the simplification of reporting. (Stanine scores and similar refinements may delight a technician's soul, but

[6] J. Lear, ed., "SR/Research," *Saturday Review,* April 6, 1957, pp. 39–40.

[7] P. Anderson, "How Social Is Science?" *Saturday Review,* April 27, 1957, pp. 9–11 and 29.

they are sheer gobbledegook to most ratees; hence they block rather than facilitate communication.)

4. Increased interaction in the rating process among different levels in the organizational hierarchy.

5. Interpretation focused *to an increasing degree* on guidance in the broad and long-run sense. (The use of ratings in the context of critical incident resolutions is, however, unavoidable.)

The last point deserves further attention. Although it is asserted with increasing frequency that a manager must be both people-minded and tough-minded about organization goals in order to fulfill his job responsibilities, it is by no means clear how these different qualities are to be reconciled. Whatever form ratings may take in the future, they must provide some solution to this problem. In my opinion, people-mindedness and tough-mindedness can find common ground and serve common goals if the rating process is *oriented toward guidance.*

Another problem which calls for serious consideration is how to effect savings in time and processing cost. In all too many cases, excessive demands have been made upon the patience and attention span of the rater.

The term "rating" itself, a rather negative one at best, may be superseded by some more positive designation—"improvement review," for example. Even now, though "personnel rating" is perhaps the most common phrase, the use of qualifying terms such as "service," "merit," "efficiency," "performance," and so on, have influenced the psychological climate in which ratings occur.

Undoubtedly, passive resistance from employees is a serious obstacle to the success of any rating system, and the established vocabulary has apparently reinforced such resistance. If it is to be overcome, there must be a change in the words used as well as the actual practices.

In short, then, the prospect appears to be for much more exacting attention to purpose and function, trait, simplification, economy, mutual participation of rater and ratee, and the orientation of the rating process toward guidance, problem counseling, and career development.

A New Approach. Some of these trends are foreshadowed in the concept of Mutual Rating developed by Henry Shelton,[8] the most constructive approach to the rating problem, in my opinion, that has as yet appeared. A brief account of this concept may serve to underscore the pre-

[8] See for example H. W. Shelton, "Every Worker an Engineer," *Annals of the American Academy of Political and Social Science*, Vol. **91** (September, 1920), pp. 1–6; "Mutual Rating; A Contribution to the Technique of Participation," *Bulletin* of the Taylor Society, Vol. **5** (April, 1920), pp. 59–67; "Mutual Rating; The Key to Employee Participation," *Advanced Management*, Vol. **13** (March, 1948), pp. 1–6. Mutual Rating is currently a subject of action research at the School of Commerce, University of Southern California, Los Angeles, under the direction of the author.

vious argument and to suggest promising directions for future research and practice in this area.

Essentially, Mutual Rating is an evaluation by secret ballot of each member of a work group by all of his direct associates without regard to rank. The profile of each person is thus compiled from the opinions of his peers and his subordinates as well as his superiors.

The indispensable features of this approach may be reduced to the following:

1. Interaction of superiors, peers, and subordinates.
2. Secret ballot.
3. Choice by participants themselves of the traits used in rating.
4. Feedback to each participant.
5. Control by participants of the uses to which results are put.
6. Repetition to provide trends for effective individual guidance.

While their specific applications will vary to meet the requirements of each user organization, these six elements constitute the core of the Mutual Rating system.

Some Advantages of Mutual Rating. It is evident that Mutual Rating is designed to overcome many of the objections that have been leveled against traditional rating systems. Its emphasis on democratic participation and interaction at all levels of the organizational hierarchy is in marked contrast to the authoritarianism of other methods. Moreover, it represents a decisive shift away from the punitive tradition to a guidance orientation which stresses the constructive uses of personnel evaluation in counseling, placement, and career development.

Needless to say, Mutual Rating cannot be regarded as a panacea for all personnel problems. Like other rating systems, it produces judgments rather than measurements and therefore must be regarded with the same healthy skepticism that should attend all products of human fallibility. But the results to date of experiences with Mutual Rating in business, governmental, and educational organizations suggest new insights into group dynamics and seem to point the way toward more creative solutions in personnel administration.

3. Three Types of Appraisal Interview *

Norman R. F. Maier

One of the most common procedures in company executive-development programs is the appraisal of a man's performance, followed by an interview in connection with the appraisal. This procedure may be set up in various ways but it is always adapted to the line organization and always requires the holding of interviews.

The skill of the interviewer is an important factor in the success of this plan and is a general managerial requisite, since appraisal interviews are conducted by supervisors at all levels. Unless skillfully conducted, however, such an interview may be an unpleasant experience for both parties and cause the interviewee to resist improving on the job. Fortunately, an interview that is satisfactory to the interviewer is likely to satisfy the interviewee as well and hence can be a constructive experience for both.

While it goes without saying that two interviewers may differ in skill, it is equally true that two *skilled* interviewers may practice quite different methods. It also follows that, while each method requires its own specific skills, more can be accomplished with the superior method even when skills are equal.

This differentiation between skill and method is important because the goal of the interview determines which method should be used to achieve it; and once we have clarified the goal in any activity, the problem of developing the necessary skills is greatly simplified. If, for example, in driving a golf ball, we are aiming at direction rather than distance, the skill we are concerned with is orientation of the body while swinging rather than force of stroke.

Unlike our somewhat simplified example, however, appraisal interviews may have various and sometimes conflicting objectives. Among them we may note: (*a*) to let subordinates know where they stand; (*b*) to recognize their good work; (*c*) to point out how and where they can improve; (*d*) to develop them on their present job; (*e*) to develop and train them

* This article has been adapted from Chapter 1, *The Appraisal Interview,* New York: John Wiley & Sons, 1958. It is reprinted from *Personnel,* 1958, **34,** #5, 27–40 by permission of the author, the American Management Association and John Wiley & Sons.

for higher jobs; (*f*) to let them know how they may progress in the company; (*g*) to serve as a record for assessing the department or unit as a whole, showing where each person fits into the larger picture; and (*h*) to warn some employees that they must do better. It is frequently supposed that several or all of these objectives may be achieved by a single interview, but this is not the case.

Conflicting Objectives. The differences between these objectives, however slight, will affect the whole course of the interview. For example, "letting an employee know where he stands" suggests a fairly comprehensive report, while an interview for the purpose of recognizing an employee's good work can be much more selective in content.

When the interview serves as a warning, some companies require the employee to sign an appraisal form. This precludes his saying at a later time that he was not told his work was unsatisfactory. However, the requirement of a signature is inconsistent with goals other than warning.

A discrepancy between the goals of the interviewer and the interviewee may also cause difficulties. For example, in praising a very superior employee who has many virtues and few faults, the interviewer may make a minor criticism or pass over something as merely "satisfactory." However, the employee may regard this as unfavorable and feel crushed by any suggestion that he could improve.

On the other hand, a supervisor may treat a weak subordinate with kid gloves to avoid hurting his feelings. Thus he may call the employee's best point "quite satisfactory" although in reality it is only about average, and praise him highly for effort. The employee may emerge from the interview feeling relieved and perhaps more secure than he should, considering his limited prospects.

This article will describe three types of appraisal interviews, each with a specific and slightly different objective. The differences are important in determining the skills required and, to a great extent, actually call for different skills from the interviewer's repertoire. A unique interaction characterizes each method, so that the three differ in kind rather than in degree. The three methods may be described as *Tell and Sell, Tell and Listen,* and *Problem Solving.*

The Tell and Sell Method. The initial aim of the *Tell and Sell* method is to communicate the employee's evaluation to him as accurately as possible. The fairness of the evaluation is assumed and the supervisor seeks (*a*) to let the employee know how he is doing; (*b*) to gain his acceptance of the evaluation; and finally (*c*) to get him to follow the plan outlined for his improvement. These three goals seem, at first glance, to be consistent with each other and in some circumstances, they undoubtedly are so.

If it is assumed that people desire to correct faults, that the superior's judgment is acceptable to the subordinate and that he is able to change

in the direction specified, then the desired aims can be achieved. However, it is not unusual for subordinates to regard their supervisors' expectations as unreasonable, their criticisms unjustified, and the methods of work they suggest inefficient. It is also unrealistic to expect a person to improve merely because he wants to. He may strive to make wise decisions, be patient, get along with people, conduct conferences effectively and stand up under strain, but such behavior may not be subject to his voluntary control.

While improvement in such things as getting to work on time, turning in honest expense accounts, and working hard is usually considered a matter of volition, here, too, more than a wish may be necessary. Frequently, the problem is one of adjustment rather than motivation. Emotional maladjustment requires therapy and improper attempts to make improvements may aggravate rather than correct the condition.

For purposes of this discussion it will be assumed that extreme cases are the exception and that the interviewer is going to deal with management people who are able to take criticism.

The Necessary Skills. Considerable skills are necessary for success in the *Tell and Sell* type of interview. They include the ability to persuade the employee to change in the prescribed manner and this requires knowing how to use the incentives that motivate him and sometimes developing new ones. The salesman must know his customer and the selling of an evaluation makes the same demands on a supervisor.

The method becomes especially difficult if the interviewer encounters resistance. Since he usually sees himself in the role of doing something for the employee's good, any failure to appreciate this gesture places him on the defensive. Thus the situation may become strained or deteriorate into obvious hostility.

However, the employee usually senses his supervisor's increased aggression before it is too apparent, and consequently refrains from questioning the evaluation. The passive resistance and verbal agreement that follow are often taken as acceptance of the evaluation by the interviewer. When the employee retreats from discussion, the supervisor may feel more obliged to talk and may end up lecturing or preaching.

Defensive feelings, whether expressed or covered up are a natural reaction of the employer to this type of interview. The supervisor is cast in the role of a judge, while the employee wants to make as good a showing as possible and tries to conceal any weaknesses. As the supervisor can never know all the circumstances and provocations, his criticism is apt to seem unjust.

Once the subordinate questions his superior's evaluation, a face-saving situation is created. Unless the interviewer is very patient or something happens to break the chain of events, the conflict will become more acute.

Since the superior usually has some power at his disposal, the subordinate invariably learns to give in. Subordinates often develop a degree of insensitivity to criticism on these occasions. The general viewpoint in the organization may be, "everybody gets criticized during appraisal interviews, so you just take it with a grain of salt." Some interviewers attempt to comfort their subordinates by telling how they, too, are evaluated and criticized.

Although the *Tell and Sell* interview may be unpleasant for both parties, this does not prove that it lacks merit. Correction usually is unpleasant, and almost everyone can recall discarding faults because of criticism that once was painful. Certainly, faulty behavior can be inhibited or replaced by having someone point out a better way. The crucial issue is finding the most effective approach. Both motivation and training are essential to change.

When a man lacks the skill or knowledge to do his job in the way his superior desires, the problem is one of training or transfer. If an employee is worthy of development on his present job, the interviewer should clarify the job demands and indicate where and how the employee can acquire the desired knowledge or skills.

Motivation to Change. The fact that people often want to do a job effectively may be sufficient motivation to adopt the correct methods and habits. The desire for the boss's approval may also provide motivation.

However, sometimes an employee has his own views about a job or does not wish to reveal his lack of ability to change. If he has "bad" habits or is negligent in certain respects, he may resist change because the undesirable behavior is attractive to him. In such instances, new motivation is necessary. One way is to make the old behavior unattractive by punishment and threats of discharge. This is similar to removing an undesirable growth by surgery. The *operative* approach is unpleasant for the employee because he must either give up the behavior he likes or suffer the consequences.

Another way is to make an alternate response attractive by rewarding it. This *substitution* method is usually more pleasant and effective than the operative, not only because punishment is unnecessary but also because an alternative is supplied. Thus a child's emotional disturbance is reduced if a broken toy is replaced by another, and a smoker will find it somewhat easier to give up cigarettes if he substitutes gum. However, something pleasant (a reward) must be added in order to make the choice attractive and voluntary.

Both methods require that an external motivating factor be added to one of the alternatives; a negative incentive (punishment) must be connected with the undesirable behavior or a positive incentive (reward) with the acceptable alternative. This form of motivation is *extrinsic* to

the activity, in contrast with *intrinsic* motivation in which the activity itself is satisfying. When extrinsic motivation is used, the new behavior is not accepted for its own sake, but for other reasons.

Both the type of motivation used and the defensive attitudes aroused limit the effectiveness of the *Tell and Sell* method. Frequently the subordinate accepts the evaluation or says he does in order to get out of the interview situation. But the fact remains that a selling method permits only two courses of action: continue as before vs. change to the superior's plan. However, plans for improving a work situation and ways to deal with a behavior problem can seldom be reduced to two possibilities.

Advantages and Limitations. A plan may be effective in one situation while it fails in another. *The Tell and Sell* method has its greatest potential with young and new employees, who are inexperienced and insecure and want the assurance of an authority figure. They are likely to respect the superior not only because of his position but also because of his greater knowledge and experience. Similar reactions usually occur in employees who are new on an assignment.

Individual differences also play a part in reactions to the *Tell and Sell* method. Persons who are easy-going, uncritical, somewhat unimaginative and ready to accept authoritarian leadership are most able to profit from it.

From the company's viewpoint the method is efficient, providing it works. Presenting an evaluation takes less time than discussing it and if the employee accepts the presentation, a fairly complete interview can be held in about 15 minutes. However, if the appraisal is resisted, considerable time may be required to achieve the potential gains of this method.

Although the *Tell and Sell* method may produce positive results under favorable conditions, it also may do more harm than good. When, for example, a subordinate thinks his appraisal is unfair, he may feel that his interests and the company's are no longer compatible. Loyalty depends on *mutual interests* and both the supervisor and the company may lose men's loyalties in the process of conducting appraisal interviews.

Again, if the interview is unpleasant, the day-to-day relationship between supervisor and subordinate may become strained and job satisfactions decreased for both.

However, the greatest risk occurs, particularly in appraising middle and top management, when the subordinate accepts the judgment of his superior and tries to please him instead of giving his best thinking to the job. Every language has a phrase for a "yes man" and no superior wants to develop one. Yet the *Tell and Sell* method is bound to encourage this type of subordinate for it assumes that the boss knows best—he is the father figure who dispenses rewards and punishments. Such an executive expects his men to want to please him and they soon learn what he ex-

pects of them, often competing with each other to gain his favor. Although the boss may ask his subordinates to make independent judgments and take initiative, the fact that he appraises and recommends motivates the weaker among them to find out what he wants and to do it his way. To forestall criticism, some even adopt the boss's manners and dress. Thus when this method works, it is likely to develop dependent, docile behavior, and when it fails, rebellious behavior may result. Needless to say, neither extreme is desirable.

Finally, what is the over-all effect on company philosophy and values? Organizations vary in the extent to which they are receptive to new methods and ideas. When evaluations are made from the top down, it is difficult for new ideas to enter, unless top personnel are recruited from outside the company. However, this may require overcoming resistance to changes down the line and is often impractical. Since the *Tell and Sell* type of interview makes no provision for upward communication, it tends to perpetuate existing values. Although changes may occur effectively when initiated from the top or when approved by the proper superiors, there is no means of stimulating new ideas. While both radicalism and conservatism with respect to change have unique values, each makes its contribution under different circumstances. Insofar as conservatism rather than change is desired, the *Tell and Sell* method is effective.

The Tell and Listen Method. The *Tell and Listen* method of conducting an appraisal interview is often viewed with skepticism because the role of the interviewer seems somewhat unnatural and ambiguous with respect to authority. The goal here is to communicate the evaluation to the employee and then let him respond to it. The interviewer covers his strengths and weaknesses during the first part of the interview, postponing points of disagreement until later. The second part is devoted to thoroughly exploring the subordinate's feelings about the evaluation. Thus the superior, while still in the role of a judge, listens to objections without attempting to refute him. In fact, he encourages the employee to disagree because the objective is not only to communicate the appraisal but also to drain off any negative feelings it arouses. The cathartic value of the verbal expression of frustrated feelings is assumed.

The initial reactions are similar to those of the *Tell and Sell* method since both begin with a presentation of the evaluation. However, the methods differ radically as regards the way disagreement and resistance are handled. Instead of the interviewer dominating the discussion, he sits back and becomes a nondirective counselor [1] during the second part of the interview.

Skills of This Approach. The skills of this approach are (a) active *listening*—accepting and trying to understand the employee's attitudes

[1] C. R. Rogers, *Counseling and Psychotherapy*, Houghton Mifflin (1942), p. 450.

and feelings; (b) making effective use of *pauses*—waiting patiently without embarrassment for the other person to talk; (c) *reflecting feelings*—responding to feelings to show understanding; and (d) *summarizing feelings*—to indicate progress, show understanding, and emphasize certain points, as well as to end the interview. None of these skills implies that the interviewer either agrees or disagrees with the employee. Rather they suggest the possibility that the evaluation may be unjust and even incorrect, and that the employee should accept only ideas which may be helpful.

Since it is assumed at the outset that there are two sides to the appraisal, face-saving issues are not aggravated. As the superior doesn't expect the subordinate to agree, he feels no need to defend his evaluation. The unpleasant aspects of the interview are reduced for he has a method for dealing with the employee's defensive responses, and is better able to understand and respect his feelings. Consequently, he will be less inclined to avoid conducting appraisal interviews than the *Tell and Sell* interviewer, who may be over-anxious.

The motivating factors in the *Tell and Listen* interview are somewhat complex. Since fears of reprisals and of displeasing the superior are reduced, inadaptive defensive behavior fanned, in part, by these fears is less likely to occur. Thus the counter-motivation known as *resistance to change* is lessened by the counseling process, but the tendency to change to avoid displeasing the boss is sacrificed. Which of these two opposing motivations is stronger will vary in individual instances.

There is also the positive motivation that comes from having a pleasant interview with the boss. Hostility is minimized and the subordinate feels accepted and important. These feelings are conducive to forming a constructive attitude toward growth. Thus a subordinate tends to want to please a supervisor he likes more than one he fears. When fear is dominant, a person, at best, shies away from wrongdoing, but does not extend himself to perform beyond the call of duty.

The motivations discussed so far are *extrinsic* in that they lie outside job activity and the work itself has not been made more interesting. However, some increase in job interest is possible. Intrinsic motivation would occur if the interview resulted in (*a*) solving some job problems; (*b*) clarifying certain misunderstandings between supervisor and subordinate; or (*c*) solving a personal problem. These gains are most probable in instances where the employee's job performances are deficient. The interview might also result in improvements in the work climate—another element of job interest.

If the superior listened and *learned* from the interview, additional gains would be possible. The superior might modify job assignments and expectations, alter his evaluation, perceive the subordinate's job differently, or discover his own negligence in training and assisting. However,

it takes an exceptional interviewer to learn from the interview. Since the appraisal is made before the interview, most interviewers feel committed to uphold it.

Benefits of the Method. This method usually insures a good relationship between superior and subordinate during the interview. The employee is likely to leave with a positive attitude toward the supervisor, feeling that the interview has been worth while and that he is important to the company. The interview provides an opportunity for the superior to learn his subordinate's needs, although his impressions may be incorrect.

However, there is some risk that the interview may not achieve its first objective—letting the employee know where he stands. In addition, while the employee may gain new insights which may cause him to change, he is not likely to discover ways for improving job performance. Thus he may leave the interview with satisfaction but without a program for developing on his job.

The values promoted by the *Tell and Listen* interview are those of tolerance and respect for the individual. Thus the method tends to make supervisors employee- rather than production-minded, an attitude which generally stimulates higher morale.[2] However, while high morale and productivity frequently are related, there may be variations in productivity among groups that have equally high morale.

The greatest value of this method comes from the fact that the interviewer may profit from the interview. Change initiated from below may occur when a subordinate is able to influence his supervisor's views on how the job may be improved in (*a*) supervision, (*b*) work methods, (*c*) job assignments and (*d*) job expectations. Frequently, superiors once performed the jobs of the men they now supervise, and very often expect their subordinates to act just as they did. Since people differ and times as well as jobs change, this expectation, while understandable, is usually impractical. In any event, a superior's expectations, at best, tend to restrict initiative and inhibit improvements. Although some of this loss may be recouped by using suggestion boxes, it is important not to stifle new ideas by an appraisal program that was designed to develop employees. A supervisor who listens and learns may encourage upward communication in deed as well as in word. The belief that constructive forces for change may spring from below can become an important part of organizational philosophy.

The Problem-solving Approach. The *Problem-solving* method of appraisal interview has grown out of the author's recent studies of executive development. Of the three methods presented here it deviates the most

[2] D. Katz, N. Maccoby, and N. C. Morse, *Productivity, Supervision and Morale in an Office Situation,* Institute for Social Research, University of Michigan (1950), p. 84.

from common-sense views. It takes the interviewer out of the role of judge and makes him a helper. Although the interviewer may want to help his subordinate, in the other two types of interview this is difficult because the process of appraising is inconsistent with that of helping. It may appear that the purpose of the interview is lost if the appraisal is not directly communicated to the subordinate. However, one must also recognize that the development of the employee often is the primary reason for conducting an appraisal interview and that *this* objective may be lost in the process of communicating the evaluation.

As has been said, appraisal interviews may serve a variety of purposes of which development is one. Although the two other methods discussed communicate the appraisal to the subordinate, they do not assure his understanding and acceptance. The *Problem-Solving* approach has no provision for communicating the appraisal, and indeed it may be unessential for this purpose. If the appraisal is required for other reasons, it may be desirable to delay making it until after the interview.

The goal of employee development immediately establishes a *mutual interest* between the interviewer and his subordinate. Both would like the employee to improve on the job and agree that the boss could assist him. When the subordinate accepts this help-giving role of his supervisor he is more willing to describe his difficulties. However, when the boss passes judgment on his job performance, their interests conflict. On the one hand, the employee wants to impress his boss favorably and hide his weaknesses. The interviewer, on the other hand, wants to avoid being deceived and to discuss weaknesses. *Mutual interests* are present only so long as the employee's merits are being praised and end when the interviewer indicates that he is somewhat less than satisfied.

Since the objective is employee development, the interviewer cannot specify the area for improvement, because this would be making a judgment. He must limit his influence to stimulating thinking rather than supplying solutions, and be willing to consider all ideas on job improvement that the employee brings up. His function is to discover the subordinate's interests, respond to them, and help the employee examine himself and the job. He must forget his own viewpoint and try to see the job as the employee sees it. If the employee's ideas seem impractical, the interviewer should ask questions to learn more specifically what the employee has in mind. Often the ideas may seem difficult to accept because they are misunderstood or viewed from a different frame of reference. Communication may be faulty unless each person tries to understand the background, attitude, and experience of the other.

When the interviewer finds that a subordinate's thinking is naive, he must be willing to assume that a problem-solving discussion is the best way to stimulate growth and sophistication. If an employee can grow in

this manner, he need not know that he has had weaknesses and faults. The process may be compared to the training of children. Telling a child that he is gawky and uncoordinated does not help him to become graceful and skilled. As a matter of fact, he will probably improve more if left to himself, instead of being exposed to extensive fault finding. However, people are often so concerned with the faults they observe that they find it difficult to suppress comments and advice. Thus a supervisor's knowledge and experience will not help his subordinate unless he knows how to share them constructively.

Exploring Solutions. Problem solving is characterized by the exploration of a variety of solutions. It is inhibited when a person feels threatened by an evaluation which directs attention to him rather than to the situation. When a person is placed in the spotlight he tries to hide his defects and to protect himself by defensive behavior. As long as he defends himself, he is not searching for new or better ways of performing. If an evaluation is very threatening it may arouse hostile and stubborn reactions which further delay problem solving.

The *Problem-Solving* approach uses non-directive skills similar to those of the *Tell and Listen* method—listening, accepting, and responding to feelings. The interviewer should be especially alert to expressions of concern at the start of the interview. Such a remark as "Well, this is the day we get overhauled, I suppose," should be met with a statement like, "I daresay you think these interviews are rough on people in some ways." However, the objective of the *Problem-Solving* interview is to go beyond an interest in the subordinate's feelings to a discussion of the job. If the employee is not over-anxious, the interviewer can ask questions about the job at the beginning. While such questions are directive, they do not limit the views and feelings that can be expressed.

In some instances, the various job activities should be discussed and evaluated. Differences in perceptions of what the job is may account for some unfavorable points in the evaluation. Thus the interviewer might learn that the subordinate saw his job as "getting an assignment finished on time, regardless of the feelings of others" and that he had gained this mistaken impression from a previous reprimand. However, the differences should be passed over, serving merely to enlighten the interviewer about the need for better job descriptions, training, or communication. Once the job is analyzed in terms of the way it is done, some time can be spent discussing the ideal working conditions.

If mutual understanding of the job has been accomplished in previous interviews, the employee can be asked to review the year's progress and discuss his problems, and satisfactions. The idea is to make the interview an opportunity to get the boss's ear.

As has been said, the superior should consider all the ideas presented.

By restating them in somewhat different words, the interviewer may test his understanding, and show his interest in considering the changes suggested. He need not agree or disagree with the ideas in order to understand and consider acting upon them.

Skillful Questioning Is Needed. Skillful questioning can stimulate a subordinate to evaluate his ideas and plans. The questions should not put him on the spot, but should indicate that the listener wants to get the complete story. The following may serve as examples of questions of this kind:

Can this plan of yours deal with an emergency situation, in case one should arise?

Would you have other people at your level participate in the plan?

What kinds of problems do you anticipate in a changing market?

Exploratory questions are effective in drawing a person out and making him think more clearly; they may also serve to direct analysis to areas that may have been overlooked.

The use of summaries and pauses, already touched upon in discussing the *Tell and Sell* method, is equally helpful in the *Problem-Solving* interview. Pauses, in fact, perform an additional function in the latter technique, since they allow the subordinate to explore and evaluate ideas without feeling the pressure of time. If a subordinate is free to analyze the job with the prospect of influencing improvements in it, he will be motivated to think constructively, in a mature and responsible way. The problem of gaining his acceptance of any changes is non-existent because he has suggested them.

The Problem-solving approach motivates original thinking because it stimulates curiosity. Curiosity is a strong drive and as long as fear is not aroused, leads to exploratory behavior. For example, children will explore a free and secure environment but stop in the face of danger or threats of punishment. Problems offer opportunities to explore and their solutions lead to new experiences. Some *extrinsic* motivations such as gaining approval or avoiding failure may be present, but essentially the problem-solving activity has interest in itself. This *intrinsic* motivation is present in many things we like to do and is an important aspect of play. If it could be made a larger part of the job, then work would become more like play.

A re-examination of the job is bound to suggest some changes because certain aspects are usually more satisfactory than others.

There are four different ways of improving job satisfaction: (*a*) the job itself may be reorganized or enlarged; (*b*) the subordinate's perception of the job may be changed; (*c*) the superior's understanding of a man's problems may be increased so that he will relate differently to his subordinate, supply assistance in the form that is needed, or improve communications; and (*d*) the opportunity may be created to solve problems

of a group nature involving relationships between the various subordinates who report to the interviewer.

Since job satisfaction may be approached in various ways, some improvements should be possible for the employee. If none come under discussion, the interviewer may ask questions to stimulate exploration of the various areas. Once different possibilities are examined, a selection can be made in terms of practicality and interest. If the goal is to improve things in some way that is in line with the employee's wishes, then there is good assurance that a change will occur.

However, in order to achieve improvement in the direction desired by the subordinate, the superior must sacrifice his right to determine the change. It may turn out that both will agree but in order to gain the change that the subordinate will accept, the interviewer must not attempt to impose his own views.

In the event that a subordinate does not express any ideas and fails to respond to the *Problem-Solving* approach, it may be assumed that this method has failed. However, the failure does not preclude the use of one of the other two methods.

Upward Communication. The *Problem-Solving* approach affords both the participants a highly favorable opportunity for learning and communicating. Training is usually considered a one-way process in which the superior gives his knowledge to the subordinate. The *Problem-Solving* approach like the *Tell and Listen* method, stimulates upward communication. In addition, it creates a climate for high quality decisions and changes since it pools the thinking of two people who have supplementary experiences. Resistance to change is a common obstacle to progress, but this approach removes sources of resistance and stimulates change.

The interviewer places *mutual interests* above personal interests, and respects the problem-solving ability of the subordinate. Exploring the job with an understanding superior stimulates new ideas and leads to increased job interest as well as a better use of the employee's talents.

The attitude of mutual respect cuts across barriers of rank, focusing attention on problems to be solved rather than on prerogatives, or status and personality clashes. It assumes that change is essential to an organization and that participation in change is necessary for individual growth.

This article has analyzed three methods of appraisal interviews and has shown that they produce different results. It has pointed out that the method is a function of the particular objective the interview is designed to serve; and has shown that interviewing skills must be related to the objective as well as the method. The manner in which skills and objectives vary with the interviewing method is shown in the accompanying chart.

The chart also emphasizes the psychological difference between the

Method	Tell and Sell	Tell and Listen	Problem-solving
Role of Interviewer ..	Judge	Judge	Helper
Objective	To communicate evaluation	To communicate evaluation	To stimulate growth and development in employee
Assumptions	Employee desires to correct weaknesses if he knows them Any person can improve if he so chooses A superior is qualified to evaluate a subordinate	People will change if defensive feelings are removed	Growth can occur without correcting faults Discussing job problems leads to improved performance
Reactions	Defensive behavior suppressed Attempts to cover hostility	Defensive behavior expressed Employee feels accepted	Problem-solving behavior
Skills	Salesmanship Patience	Listening and reflecting feelings Summarizing	Listening and reflecting feeling Reflecting ideas Using exploratory questions Summarizing
Attitude	People profit from criticism and appreciate help	One can respect the feelings of others if one understands them	Discussion develops new ideas and mutual interests
Motivation	Use of positive or negative incentives or both (Extrinsic in that motivation is added to the job itself)	Resistance to change reduced Positive incentive (Extrinsic and some intrinsic motivation)	Increased freedom Increased responsibility (Intrinsic motivation in that interest is inherent in the task)
Gains	Success most probable when employee respects interviewer	Develops favorable attitude to superior which increases probability of success	Almost assured of improvement in some respect
Risks	Loss of loyalty Inhibition of independent judgment	Need for change may not be developed	Employee may lack ideas Change may be other than what superior had in mind
Values	Perpetuates existing practices and values	Permits interviewer to change his views in the light of employee's responses Some upward communication	Both learn since experience and views are pooled Change is facilitated

methods—in the attitudes they reveal and the motivations they develop. It is hoped that this analysis will assist interviewers in adopting the methods and skills that support their particular objectives.

As has been said, common sense is often misleading, and too many or opposing interviewing goals may make it impossible to achieve any of them.

4. Psychological Evaluation of Work Capabilities *

Lee W. Gregg

Given a man and a job, there are a variety of questions that one can ask about the man's ability to perform the job. With a suitable measure of work output—a criterion—the man's present level of performance, how well he can now do the job, can be assessed. Ability measures also form the basis for answering questions about the man's probable future performance after he has had further experience with or training for the job. Evaluating present ability and predicting future proficiency have been the primary concerns of industrial psychologists in their attempts to select industrial or military personnel.

There are other questions about the man-job relationship, however. What peak output can be achieved for very short intervals? What rate can be sustained over fairly long intervals? How long can a man be expected to maintain a particular rate without rest or relief? What rest intervals are sufficient to keep performance level high for periods of weeks, or months, or years? At what age should a man be retired from a particular job? These are some of the questions that arise in evaluating capabilities for work.

Such questions imply a decrement in performance brought about by exposure to work and the work environment. The sources of such decrements may be fatigue produced by prolonged muscular exertion or physiological changes that result from adverse environmental conditions such as temperature extremes, excessive noise levels or contaminants in the air the worker breathes. Less obvious are the decrements produced by the purely psychological consequences of both physical and mental work including boredom, inattention, anxiety, and sometimes, specific fears.

* Based on an article from the *Archives of Environmental Health,* March, 1961, published by the American Medical Association.

An understanding of these factors and normal aging effects as well form the essential body of knowledge for evaluating work capabilities.

Although there are different ways of putting the questions concerning capability for work, each of them reduces to the task of obtaining measures of the worker's present state, and from this information predicting either the changes expected at a specified future time or that future time at which changes of a certain amount will have occurred. The problem of evaluating work capability is a prediction problem. Logically, the task is the same as in selection where the prediction is based on the expected improvement that should occur after training or additional job experience. Instead of improvement, work decrement functions predict decreases in proficiency of performance.

For example, when we ask how long a man should be expected to work continuously at a job involving close visual inspection of printed materials, we must know his initial level of performance and the expected rate of deterioration in performance over time. The solid line of Figure 1 depicts a possible form of decrement in visual performance. The broken, horizontal line represents the minimum acceptable level of performance. Simply finding the point where these two lines intersect leads to the prediction that the work period should be a little less than four hours. Beyond that amount of time performance falls below the critical level.

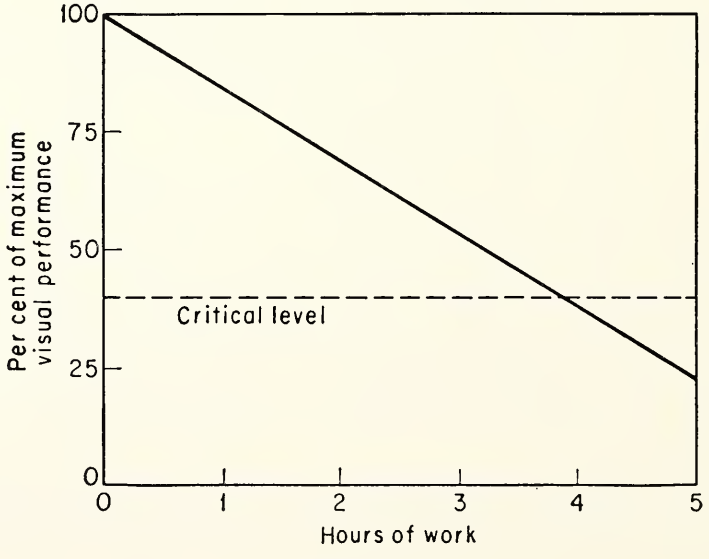

Fig. 1

There is uncertainty in our predictions even in this relatively simple example. We have assumed that the decrement in visual performance that was used to determine the values is appropriate for the man or men who are to carry out the job. Such curves are usually obtained by averaging over many subjects and may not apply either in starting point or rate of decline for a particular individual. The solution in practice is to apply what amounts to a safety factor. The variability around the average

curve is determined, and upper and lower limits are constructed establishing an interval in which "most" of the population of workers fall. The lower bound of the interval then serves as the basis for prediction. A work period established in this way is essentially fixed by the performance of those who have a lesser tolerance for the stresses of the work than the bulk of their fellow-employees.

Apart from the problem of individual differences, other assumptions lead to uncertainty in prediction. We assume that the work inputs on the actual job are the same in kind and amount from those which the decrement curves were obtained. We further assume that these inputs remain constant over the time intervals with which we are concerned. Even in the short run, such assumptions are tenuous. As a general principle, the farther into the future we try to push our predictions, the greater is the potential error in them. The uncertainty becomes greater because we are unable to control completely the activity of the worker in the intervening time periods.

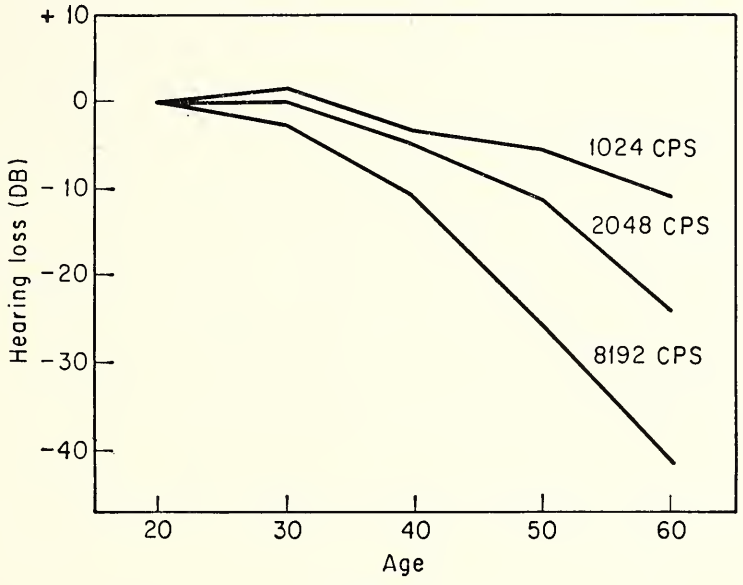

Fig. 2

When the time intervals are years instead of hours, the prediction problem is further complicated because we must consider normal aging effects in addition to the stresses associated with job demands. In the area of sensory physiology we have an example of the progress that we can expect in the analysis of such problems. From the earliest observations on "Boiler-maker's disease" to controlled experiments on "stimulation deafness," many facts concerning hearing loss as a result of exposure to intense noise have accumulated. We have learned what frequencies, intensities, and durations will produce damage to areas of the basilar membrane. Moreover, we have data from large scale audiometric tests that have provided stable hearing loss curves as a function of age for the normal population. Fig. 2 shows the typical, progressive loss of hearing

that occurs with increasing age. In general, sensitivity declines gradually but to a greater extent for high frequency tones than for low frequency tones. How might these pieces of information be used in evaluation?

For a particular job, we would need to know two things—the characteristics of the noisy environment; and second, the auditory acuity required for acceptable performance of the job. If the frequencies, intensities, and durations are such that exposure to the environment would lead to impairment beyond that attributable to normal aging effects, then moral, legal, or other factors must determine the "capability" of men to undergo such exposure. Or, the noise must be reduced. Assuming a nondangerous environment, the valuation or prediction would attempt to establish how long the worker can be expected to continue before normal hearing losses reduce his sensitivity to the point where masking by the environmental noise interferes with job performance.

Even in this highly delimited area where the physiological response system is well understood and where the inputs to the system are physical variables, we encounter a great deal of difficulty. More often than not the knowledge derived from the controlled observations is used to identify adverse environmental conditions which are likely to cause damage or interference. Then steps can be taken to modify the job or the circumstances under which it is performed so human tolerance limits are not exceeded.

An illustration of this approach is the proposed solution to the problem of communication in an extremely noisy environment—the driver of a tank or the operator of a crane might be in such circumstances. The use of headsets might produce satisfactory hearing, but only at intensities that would also produce damage. Instead, the possibility of communication through vibratory stimulation of the skin (Geldard, 1960) or through electrical stimulation of various body areas (Gilmer, 1961) could permit the use of ear-defender devices and at the same time provide the necessary communication links.

Thus far we have considered predications based upon a single performance (or sensitivity) decrement. Does this mean that for most industrial jobs there is but one critical aspect of each of the jobs? Just the opposite is true. There are usually many different functions that a worker must carry out. Only a few may be "critical" in the sense that failure to possess them means failure in the job. But could we not find a single "over-all" performance measure that would predict decrement over time for each job?

Even if it were possible to do so—and it would be extremely difficult for those jobs where there are no obvious units of production—our understanding of the fundamental physiological and psychological costs would not increase very much, nor would this be an adequate practical solution. It would be necessary to obtain at least as much information about each

individual job as we have obtained over the period of 70 years on hearing loss. Jobs may and do change and by the time our facts were gathered, new sets of circumstances would invalidate what was learned earlier.

A more fruitful approach is the one that examines the wide variety of job behaviors exhibited by the worker and, from these, extracts components that have been called by various names—job elements, job factors, and the like. Such components may be identified and exist in varying degrees in all jobs. They represent the processes that the worker carries out, sequentially and repetitively, in performing work. Psychologists stress the importance of determining these processes from observation of actual job behavior. A job description in terms of the functions of the job, what the worker is supposed to do, can be quite different from a description based on what he actually does.

The value of this approach is obvious. If a set of processes can be identified from which particular jobs can be compounded and adequately described, decrement functions for the basic processes only need be determined. Predictions could be made for jobs that do not now exist.

What progress can be reported at this time? For most jobs it is possible to identify basic sensory or motor skill demands. We can specify visual or auditory acuity requirements or simple reaction time, coordination, or strength demands. Difficulties arise almost immediately when the sensory aspects involve more complex judgments or the coordinations depend on transmitted information other than simple yes-no signals. Our understanding of the basic cognitive processes in general, and especially their role in relation to industrial job performance, is very limited.

We can expect the need for such knowledge to become more and more critical because industrial jobs are becoming less and less dependent upon simple sensory or motor factors. Technological progress has steadily eliminated requirements of great physical strength or high sensory ability. A hand control activated by pressures of only a few pounds guides machines that lift many tons. Electronic devices enable us to track objects hundreds of miles away, even through banks of fog and clouds. Efficient use of such machines rests on cognitive abilities—processes whereby information is assimilated and complex decisions based on this information are made.

Attempts to correlate physiological indices such as heart rate, oxygen consumption, blood pressure or generalized tension with measures of indecisiveness, or anxiety, or mental effort have been less successful than similar studies where the work involved is physical. Yet it is clear that mental work can and does produce stress and anxiety. We can single out jobs that are easily loaded in this respect: the commercial pilot who is responsible for the lives of his passengers, the air traffic controller upon whom the pilot must depend, the military officer in an air defense command, and the industrial executive in any number of settings upon whose

decisions vast sums of money can be properly or improperly handled. In such jobs, even those involving substantial amounts of sensory or motor skill, the dominant characteristic becomes the cognitive strain associated with the active anticipation of the consequences of particular decisions. At present, the identification of the dimensions of mental work is just beginning.

We may suppose, however, that the next decade will show very great progress toward the definition of mental work. This supposition rests in large part in the development of new and powerful analytical techniques. Our understanding of basic human mental processes, and hence, the potential for evaluating capability for mental work, has received tremendous impetus from recent advances in computer technology. In particular, the simulation of human thought processes by means of high speed digital computers—a technique pioneered by Newell, Shaw & Simon (1958)—has provided a tool for describing human cognitive behavior.

The basis of the technique is the definition of processes for manipulating symbols through a computer program. The program is a precise set of statements outlining the ways in which the symbols are "noticed," "compared," "associated," and so on. If these symbols represent objects, or properties of objects, or relationships among objects, the machine can then respond to inputs and will "behave" in ways determined by the structure of the processes available to it.

If the behavior of the machine and the behavior of a person receiving the same "environmental" inputs are similar, we have produced evidence that the processes are organized in roughly the same ways. The mechanisms mediating such processes may be organismic neural events in the case of man, or electrical or mechanical events in the case of the machine. The "hardware" matters little, so long as we have an adequate description of the processes. The program, in essence, becomes a theory of behavior, and one that can describe the single individual instead of the "average" man.

The fact that learning phenomena can be programmed into the computer's behavior suggests that other dynamic processes could also be simulated. Here then we would have a theory of work and effort which could guide us in our physiological measures, could be used to predict work capabilities of a single individual, and do this for a wide variety of circumstances where the complex interaction of many sensory, motor, and cognitive job demands defies analysis in any other way.

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5. Relationships among Criteria of Job Performance * [1]

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This paper reports an empirical exploration of the generality of relationships among criteria of job performance in an industrial situation. This is one report of a series of studies aimed at discovering how the performance of individuals and of organizations can be conceptualized and measured adequately.[2] Here we are concerned with the question whether a set of intercorrelations among job performance criteria is likely to be unique to the population and situation studied, or whether, instead, it can be considered to be an approximation of some generally valid system of criterion relationships.

The Problem. While the use of multiple criteria in studies of individual and organizational job performance is becoming more common, it is still rare. It is even more rare that multiple criteria are chosen or treated in terms of some theory of the composition of job performance, or in terms of some rational basis for choosing among, combining, or treating separately the various measures of performance. The few studies of multiple criteria have without exception raised new and serious problems, as well as doubts about assumptions that are commonly made (Gaier, 1952; Rush,

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[1] This work has received financial support from three sources: The Faculty Research Fund of the Rackham School of Graduate Studies, University of Michigan; the Institute of Labor and Industrial Relations, University of Michigan and Wayne State University; and the firm which collaborated in the study.

[2] Other reports in preparation deal with the generality of the factorial composition of performance measures, with the predictability of alternative performance measures, and with the empirical testing of alternative models for predicting the performance of individuals and organizations.

1953). The study by Kelly (1957) of the performance of medical students is an example. From an analysis of 32 criterion variables, he concluded that the criterion relationships are variable in size and sign, and that most of the common variance is accounted for by five factors, of which four are relatively independent of one another. It is clearly not reasonable, in the case of these medical students, to take one measure as representing total performance, or to combine the measures in any simple way.

One approach to the solution of multiple criterion problems lies in postulating a unidimensional construct representing "overall job performance" or "net performance," and to treat various separate measures as independent estimates of such a single variable. This approach leads to attempts to combine the elemental criteria through techniques which maximize a common factor, maximize the predictability of the joint elements, or weight the elements in accordance with their reliability or predictability (Brogden & Taylor, 1950; Nagle, 1953; Thompson, 1940). The logical problems here arise from the common finding that the elements of performance may be negatively correlated, that the elements interact, and that the resulting single measure does not reflect well the values implied by the initial choice of elemental measures.

Progress in the conceptualization and measurement of work performance is likely to lie in the direction of creating some theory (or several theories) of performance comparable in nature and complexity to those which have been developed in other areas of human behavior, e.g., "intelligence" and "personality." However, to move in such a direction requires that we first do some exploration of the range and incidence of the relational phenomena with which we are concerned. In this paper we will deal with only three issues: (*a*) whether "job performance" reasonably can be treated as an unidimensional construct, (*b*) whether the relationships among a set of criterion measures are constant within error limits, in similar organizations rather than being unique in each organization, and (*c*) whether the relationship among a set of job performances are the same when treated as referring to a population of individuals as they are when treated as referring to a population of sets of individuals comprising separate organizations.

Source and Nature of Data. For the present analysis we have confined our attention to five job performance variables, four of which are "objective" and one judgmental. The variables are called (*a*) overall effectiveness, (*b*) productivity, (*c*) chargeable accidents, (*d*) unexcused absences, and (*e*) errors. It is not proposed that these five variables represent all aspects of performance. They were selected from a larger roster of measures because of their face validity with reference to the purpose of the firm, their objectivity, their measured or estimated high reliability, and their relevance to both individual and organizational performance.

The data concern a delivery service firm having operations in several

metropolitan areas in different parts of the country. Each area is organized as a "plant" with two or more major divisions, and each division has several operating units called "stations." A typical station has a supervisor, an assistant supervisor, several "night men" or "loaders," and about 25 drivers or deliverymen who work days delivering packages on their respective routes. The stations are geographically separated from one another, and somewhat variable in size but otherwise remarkably alike. They perform the same kind of activity, employ uniformly standard equipment and procedures, draw upon the same organizational and financial resources, employ the same system for establishing work standards, observe the same managerial and personnel policies, and maintain uniform records. Twenty-seven such stations, and their 975 nonsupervisory employees, comprise the populations for this report.

The data allow the computation of relationships among the five criteria for different populations as follows: (*a*) for all individuals ($N = 975$), (*b*) for all stations ($N = 27$), and (*c*) for individuals in each of the separate stations (*N*s ranging from 13 to 54).

Description of Variables: *Productivity.* This measure was derived from individual worker records showing "allowed" and "actual" hours for an assigned daily task. Allowed times are synthetic standard times computed from locally established elemental times, or else direct standards derived from time study of the particular job in question. The data were reduced to the number of man-hours over or under "allowed" for a given period of time. Productivity data were available for all members of each station except those few assigned to jobs for which there are no time standards. Data for a one-month period were used. The productivity of a station was derived by averaging the productivity of the members. These data have interval scale properties, and for individuals range from 30 to 70. Individual performance in terms of this productivity measure is remarkably reliable, giving a correlation of about .91 for successive two-week periods.[3]

Effectiveness: Individual. Each station manager was asked to rank-order all of his men on the basis of his judgment of the overall quality of their job performance, taking into account any special circumstances relevant to each individual's assignment. Rankings were sent directly to the research team as confidential data. Within each station, the rank-orders were normalized and reduced to a scale with a range of 1 to 7.

Effectiveness: Station.[4] Independent judgments were obtained from a

[3] For a more detailed description of this variable, see Georgopoulos and Tannenbaum (1957).

[4] Both individual and station effectiveness ratings are, no doubt, somewhat contaminated by the rater's knowledge of past performance records. For example, they have common variance with measured productivity of 10% and 55% respectively.

group of operating and staff managers concerning the relative effectiveness of the various stations. The raters had first-hand knowledge of the stations they rated, but were not directly involved in the operation of the stations. Judgments were obtained in the form of ratings on a five-point scale of the overall performance of the station as a whole during the prior six months. Raters were given instructions intended to assure that they would take into account any unique circumstances in each station, and take into account all aspects of station performance. The ratings were sent directly to the research team as confidential information, in order to maximize the independence of judgments. This measure was actually obtained before collection of other data, and was a basis for selection of stations for study. Stations on which there was disagreement among raters were eliminated from the study. Consistency among raters exceeded expectations; reliability cannot be known but is probably high.

Accidents. Since the firm operates trucks on public roads and streets, accident hazards and costs tend to be high. Each accident is investigated, and if it involves any degree of negligence or improper performance on the part of the employee, it is considered a "chargeable accident." The number of chargeable accidents during the two years preceding the study was used as a measure of performance. The range for individuals is from 0 to 9+. Station performance is represented by the mean of individual scores, and ranges from 0 to 3.81 chargeable accidents. These measures have ratio scale properties, and in the case of the individual data, scores are bunched at the low end of the scale.

Absences. Since the work of a station is highly coordinated and tied to a daily schedule, an unanticipated absence may sometimes be costly and disruptive. Individual scores on absence represent the actual number of instances of "unexcused absence" during a two-year period, with individual scores ranging from 0 to 9+. Station performance on absences is represented by the mean of individual member scores, and ranges from 0 to 1.51. These data have ratio scale properties.

Errors. This variable is intended to represent the quality of work performed by a driver, and is based on his performance in making delivery in difficult cases. For each driver, there is a daily count of "C.O.D.'s" and "send agains," these being instances of nondelivery. Return of a package to the station may, of course, occur for reasons beyond the control of the driver, but there are also differences in performance arising out of the driver's familiarity with the habits of people on his route and out of the driver's ingenuity, effort, and judgment in making delivery through neighbors and in other ways. To an extent, these all reflect "quality" of performance. For present purposes, individual scores are based on a count of nondeliveries over a one-month period. The reliability of this variable is $r = .76$ for successive two-week periods for individuals. Sta-

tion performance on this variable is based on the mean of member scores, and ranges from 1.85 to 4.69 instances of nondelivery.

Plan of Analysis. Pearson *r* correlations were computed for all pairs of variables for all types of analyses. In some cases, some error is involved in this choice of procedure as the absence and accident data do not meet the homoscedasticity requirement and one variable in each set has only ordinal properties. The data were then analyzed in a manner that allows assessment of the hypotheses stated below.

It is a common practice to assume that any one of several relevant criteria of job performance may be taken to represent the totality of job performance. This is the case in all studies in which a single variable (such as productivity, length of tenure, or accident rate) is used as a basis for evaluation of predictor variables (e.g., selection tests, training methods, etc.). The implicit model of "over-all job performance" is one of multiple elements having additive or multiplicative relationships such that the elemental measures may be used separately as estimates of "true" performance or that the elements may be combined to reduce measurement error or bias. This conception is tenable only if it is generally true that job performance criteria are significantly related in consistent ways, and if the relations, with due allowance for measurement errors and unreliability, are high. *Hypothesis: Intercorrelations among a set of job performance measures for a given homogeneous population of individuals or organizations will be consistent (in terms of positive or negative association) and relatively high.* It is our expectation that this hypothesis will be found invalid, and that the lack of validity of the model from which it derives will be demonstrated.

Few investigators have concerned themselves with the question of comparability between job performance at the level of the individual and job performance at the level of the organization. This neglect probably arises out of the practical difficulty of getting performance measures for a homogeneous set of organizations, and measures that are comparable at both individual and organizational levels. We propose here, as a basis for analysis, the simplest conception of the matter, namely, that there exists some generally valid system of relationships among a given set of performance variables such that the same relationships hold whether the performances are those of an individual or those of a set of individuals who share the work of an organization. *Hypothesis: The pattern of intercorrelations among a set of job performance variables, with allowance for measurement errors, will be similar in size and sign as between the individual and organizational levels of analysis.* A confirmation of this hypothesis will lend support to the view that there may exist some widely generalizable system of relationships among the several components of job performance. A denial of the hypothesis will suggest that the con-

ceptual meaning of the job performance variables changes when one shifts the referent from individual to organization. It would suggest also the possibility that there is a still different set of relationships among the variables which applies to other units of analysis, e.g., each of the subtasks comprising an individual's job as compared with the individual's total job or the organization's job.

Another common assumption about job performance measures relates to the presumed invariance of relationships across a set of similar organizations. The limited available published data show wide variations in relationships among aspects of job performance for unlike occupations and unlike organizations. However, it is customary to generalize findings from one situation to a class of apparently similar situations. It is possible that such generalizations are valid. It is also possible that each situation is unique and that there does not exist a "pattern" of criterion relationships which holds for all members of a set of similar organizations. Our hypothesis, however, is stated positively, as follows: *The relationships among job performance criteria for the individuals in any one organization are, within limits of measurement error, representative of the relationships which hold across a homogeneous set of such organizations.* Our expectation is that there will be more variance in criterion relationships than can be attributed to the random effects of measurement error and sampling.

Results: *Hypothesis I.* Results relevant to Hypothesis I are presented in Table 1. Table 1-A shows interrelationships among the five criteria for the population of 27 organizations (stations). Of the 10 correlations only five have a sign consistent with the hypothesis that "good" performance on any variable will be related to "good" performance on others. Four of the 10 correlations are statistically significant at the .05 level or lower, and the sizes of correlations bear no apparent relationship to the known or estimated reliability of the component variables. It appears that three of the five criteria—effectiveness, productivity, and errors—constitute a set of internally consistent criteria, while accidents and absences are inconsistent with that set and unrelated to each other. For example, good performance with respect to accidents (i.e., low accident rate) is associated with poor performance with respect to productivity (i.e., low productivity); low accident rates are associated with high error rates. It appears that "job performance" as measured by these variables at the organizational level, does not constitute a unidimensional construct and may even be differently constituted, in terms of direction of relationships, than might be expected. That is, the five variables are not all significantly related to one another, nor do all the variables appear to belong to a common cluster.

Table 1-B replicates Table 1-A but shows the interrelationships for the population of 975 individuals. Of the 10 correlations, nine have signs consistent with Hypothesis I, but the reversed one is statistically signifi-

TABLE 1. INTERCORRELATIONS AMONG FIVE JOB PERFORMANCE CRITERION VARIABLES IN 27 OPERATING STATIONS OF A DELIVERY SERVICE FIRM (DECIMALS OMITTED)

Criteria	Population A (Station)				Population B (Individuals)				Population C (Individuals within Stations)			
	2	3	4	5	2	3	4	5	2	3	4	5
Effectiveness	74 *	25	−10	−46 *	28 *	−02	−08	−32 *	36 *	−05	−17 *	−42 *
Productivity	—	30	08	−39 *	—	12 *	−01	−26 *	—	−01	02	−23 *
Chargeable accidents ...		—	02	−65 *		—	03	−18 *		—	09	04
Unexcused absences			—	−11			—	15 *			—	17 *
Errors (nondeliveries) ..				—				—				—

* Significantly different from zero at .05 level or better. Population A: 27 stations. Intercorrelations based on means of member scores. Population B: 975 individuals. Nonsupervisory employees in all stations. Population C: Approximately 975 individuals. Intercorrelations shown are weighted average within-group correlations for individuals grouped according to station membership. Zero correlations arising from instances of within-station invariance are omitted from data. Station *N*s range from 13 to 54, with a mean of 36.

cant. In addition, the correlations are all small in absolute magnitude, indicating that there is little common variance among the five variables. Considering both sign and size of correlations, there is general confirmation of the conclusion reached on the basis of Table 1-A, namely, that there appears to be an internally consistent set of three variables, and two other variables independent of that set.

Table 1-C is an alternative representation of the intercorrelations of the five variables at the individual level but, in this case, the data show the weighted average intraclass correlation computed separately for each of the 27 organizations. This treatment removes any effects, whether spurious or valid, arising from the clustering of our 975 individuals into 27 organizational sets. The findings in this table more nearly conform to Hypothesis I than do the results in Tables 1-A and 1-B, as there is now only one insignificant reversal of sign, and the pattern differentiating the accident and absence variables from the remaining three is less apparent. However, the correlations remain low, and there is little common variance in our set of five performance measures.

Hypothesis II. This hypothesis proposed that the intercorrelations among the five criteria will be similar in size and sign at the individual and organizational levels of analysis. Comparing Tables 1-A and 1-B, it can be seen that the correlations tend to be higher in the case of the organizational level of analysis, and substantially higher in some cases. For example, effectiveness vs. productivity shifts from +.28 to +.74, and accidents vs. errors shifts from —.18 to —.65. There is one rather large shift involving a reversal of sign, from +.15 to —.11 in the case of absences vs. errors. These results do not permit any conclusive interpretation as the obtained differences in correlation size are variable and not subject to statistical test of significance. They may be statistical artifacts.[5] The differences in pattern of correlations between individual and group levels are also rather modest and possibly insignificant.

Hypothesis III. Hypothesis III proposed that there is an invariance of criteria interrelationships across a set of similar organizations. To test this hypothesis, the intercorrelations among our five variables were computed separately for individuals in each of the 27 stations. The results are shown in condensed form in Table 2.

According to the operational hypothesis, we should expect the correlations between any pair of variables to be the same for all stations, within limits of measurement and sampling error. We should further expect that the average within-groups correlation for each pair of variables should, within error limits, be representative of the obtained distribution of cor-

[5] We have here a specific case of the more general problem of interpreting the conceptual and statistical differences between the individual datum and the aggregate or group datum. It is not clear whether the differences we show occur because of, or in spite of, purely statistical considerations.

Table 2. Summary of 270 Intercorrelations among Five Job Performance Criterion Variables for 975 Nonsupervisory Employees within Each of 27 Operating Stations of a Delivery Service Firm

	Effectiveness Versus				Productivity Versus			Accidents Versus		Absences Versus
	Productivity	Accidents	Absences	Errors	Accidents	Absences	Errors	Absences	Errors	Errors
Obtained Range of Correlations [a]	−.558 to +.830	−.441 to +.443	−.444 to +.359	−.737 to +.232	−.257 to +.503	−3.42 to +.373	−.888 to +.282	−.224 to +.962	−.502 to +.498	−.117 to +.509
Number of + Correlations	26	11	5	2	11	8	4	4	14	11
Number of − Correlations	1	16	14	25	16	9	22	13	13	6
That are: [b] 0	0	0	8	0	0	10	1	10	0	10
Weighted Average Within-Group Correlation [c]	+.357	−.046	−.169	−.421	−.014	+.019	−.224	+.088	+.038	+.168
Probability that the Obtained Correlations Are Homogeneous [d]	Very Low	Low	Very Low	Very Low	High	Low	Very Low	Very Low	Low	High

[a] Omitting certain extreme cases that are unreliable for reason of small *N*. Actual obtained ranges are greater for some pairs.

[b] Most of the zero correlations are spurious as they arise from invariance on one of a pair of variables, usually "absences."

[c] Omitting spurious zero correlations arising from instances of invariance on one of a pair of variables.

[d] Probability was assessed by the Fisher-Snedecor technique (Snedecor, 1948, Pp. 151–155). Chi squares having *p's* of 0–.05 and .05–.20 were considered to represent respectively "very low" and "low" probability that the obtained distribution of correlations could have arisen from a sampling of a population having a correlation equal to the weighted average within-group correlations shown above.

relations. These expectations are met with a high level of confidence only in the case of two pairs of variables—productivity vs. accidents, and absences vs. errors. With reference to the other eight pairs, one cannot with confidence say that there exists for this set of organizations any correlation which is "representative" or "typical" of the relationships between a given pair of job performance variables.

The absolute size of the obtained differences in correlation is quite striking for some of the pairs of variables. For example, a station chosen at random from this firm could produce a correlation between accidents and errors anywhere from about —.50 to about +.50. For effectiveness vs. accidents, the range is from —.41 to +.44. For effectiveness vs. productivity, the range is from —.56 to +.83. The variation is so great that even the pair of variables with highest average correlation produced two reversals of sign.[6]

One must conclude from this evidence that the relationships among various aspects of job performance are highly variable, even within a set of unusually similar organizations. For organizations of lesser homogeneity, one should expect even greater variation in criterion interrelationships. The hypothesis that there exists some generalizable set of relationships between various aspects of job performance is not supported.

Discussion. These results indicate that relationships among certain different aspects of job performance are generally small, and that the size and direction of relationships are to a large degree unique to each population and situation, and somewhat different for organizations as contrasted to individuals. There is little support for the notion that there may exist some generalizable pattern, or set of patterns, describing the composition of job performance and the relationships among the components of job performance. The evidence, however, does not warrant the serious consideration of an extremely opposite view, namely, that criterion interrelationships are indeterminate or random. The following discussion presents some reasons for discounting this view and possible ways of finding the elusive organizing principles which will reveal the orderliness of otherwise random-appearing phenomena.

Choice of Criterion Variables. The present study deals with only five job performance variables, chosen because they have face validity, objectivity, and either measured or estimated high reliability. It is unlikely that these measures are all independent of one another. It is likely that there is some interaction among them. It is unlikely that they adequately represent any true factor structure of job performance that may exist. A proper test of our hypotheses would require the use of variables that are factorially pure and cover a wider range of on-the-job behavior. One clue

[6] These ranges are, of course, unstable as a single instance sets each of the extremes reported here. A replication of this study would not produce the same ranges, but would show a similar degree of variability.

to the relevance of this criticism of the results is to be seen by post facto interpretation of the data itself. Had we used only three variables—effectiveness, productivity, and errors—the results would have conformed much more closely to our hypotheses in most (but not all) tests.

Choice of Firm. The study was done in a firm in which the operating units (stations) are unusually similar in structure and function. This was considered an advantage, as this high degree of homogeneity can maximize the possibility of finding uniformities in criteria interrelationships of a kind that would confirm our hypotheses. However, it is also true that a high degree of population homogeneity can allow an undetected conditioning variable to maximize its effect. This is an improbable but possible defect in the study.

Range of Variation. The obtained correlation between a pair of criterion variables depends in part upon the "range of talent" or absolute range of variation on the two measures. It may be that our populations of individuals and organizations are so uniform that only small correlations could be generated, and that the size of these depended more on range than on "true" covariation. This would account for some of the apparent randomness of obtained correlations. Although plausible, this argument appears to have little merit, as the absolute variations in productivity, error rates, and accident rates, for example, seem relatively large rather than relatively small in comparison with the ranges commonly reported from other kinds of firms. A specific test of this possibility was made in the case of Hypothesis III, as the several organizations differed considerably in the absolute range of performance on some of the five variables. However, there proved to be no significant connection between absolute range and the obtained size or direction of criterion interrelationships, except in the case of accident rates. Even in this case, removing from the population of organizations those which were relatively invariant on one or more variables had no significant effect on the overall results.

If we assume that the results are generally valid, in spite of these defects, there remains the problem of speculating about the modifications and elaborations of theory that will be necessary in order to measure and assess uniformities that we assume to exist in the relationships among elements of job performance. Three possibilities are here proposed.

Patterning. It is possible that an individual or an organization has a limited number of "choices" among alternative patterns of criterion relationships. One could speculate, for example, that if one aspect of job performance (e.g., safety, or productivity) is given priority in job performance, then a given pattern of relationships among other performance variables may necessarily follow. The patterning of performance variables may also follow from individual or organizational preferences among certain nonperformance values, personnel policies, and the like. The presence of several such "patterns," each uniform across a subset

of a population of organizations, could produce a superficial appearance of randomness in criterion relationships. An inspection of the data for our 27 organizations, however, did not reveal any patterns which recurred frequently enough to encourage more precise analysis along this line.

Conditioning Variables. It is possible that there are some conditioning variables, operating like catalysts in a chemical system, which need to be taken into account in order to discern uniformities in the relationships among job performance variables. For example, it is plausible that productivity and accident rates may have a positive relationship under conditions of low hazard and a negative relationship under conditions of high hazard, and that both conditions could occur in the same organization.

Independent Causal Variables. Each of a set of job performance variables may well be dependent upon different causal variables, or differently weighted common determinants. There is considerable evidence already that different aspects of job performance may be to some extent independently determined (Brayfield & Crockett, 1955; Ghiselli, 1956; Vroom, 1959). Under these conditions it cannot be expected that criterion measures will be highly correlated, and it is possible also for fluctuations in intercorrelations to arise from differential weighting of causal elements in each situation. If, for example, Criterion Variable $V_1 = f(ax_1 + bx_2 + cx_3 \ldots)$, then in different organizations the values of the coefficients, a, b, c, etc., could be different in such a way that Variable V_1 would have a different composition from situation to situation. Such a condition would lead to criterion intercorrelations of great variability as each criterion may be a product of a different causal system.

In any case, it seems clear that it is risky to make any simple assumptions about the elements which comprise "job performance," and about the probable relationships among them in any given situation. The weight of the evidence favors more emphasis on the use of multiple criteria and, at least for the present, the separate treatment of each criterion. The practice of combining criteria is likely, in many cases, to simply randomize out real differences in quality of performance or, at best, to maximize a unitary construct of "job performance" which is unique to the population which originally provided the raw data.

Summary and Conclusions

Intercorrelations among five job performance variables for 27 organizations and for their respective and combined members show that the relationships are generally small, and that the size and direction of relationships are generally more variable than can be accounted for on the basis of measurement and sampling errors.

These data are interpreted as contradicting the validity of "overall job

performance" as a unidimensional construct, and as a basis for combining job performance variables into a single measure having general validity. The data also indicate that the use of a single job performance variable as a "sample" of a set of job performances is not justified without prior determination of interrelations among the different aspects of performance.

It is proposed that the measurement and use of job performance criterion variables will remain at a primitive and empirical level until there is created some complex theory of job performance which takes into account systems of causal and conditioning variables.

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Part Six: WORKER EFFICIENCY AND WORKING CONDITIONS

1. Effects of Noise Reduction in a Work Situation *

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E. A. J. Little

Introduction

The present state of knowledge concerning effects of noise on man has been reviewed by Broadbent.[1] Roughly speaking, it is that results of laboratory experiments have now established that an effect of high intensity, meaningless, and continuous noise may appear on working efficiency in laboratory tasks which are long and require continuous attention. The effect of the noise is to increase the frequency of momentary lapses in efficiency rather than to produce decline in rate of work, gross failures of co-ordination, or similar inefficiency. Effects have never been shown with noises of less the 90 db (above the usual arbitrary level of .0002 dynes/sq. cm.). In view of the rather specific nature of the effect found in the laboratory, it remained a doubtful question whether this effect of noise is of any practical importance. Furthermore, no matter how prolonged the laboratory experiments, they cannot hope to involve people who are as accustomed to noise as they would be in a real-life working situation. For these reasons it has become very desirable to check the results of the laboratory experiments in an actual working environment.

There are considerable difficulties in finding a suitable situation for a study of this type. On the one hand, since the effect is expected to be in the incidence of human error rather than in output, the task studied needs to be one which will provide sufficient of such errors for statistical

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[1] D. E. Broadbent, "Effects of Noise on Behaviour," in C. M. Harris (ed.) *Handbook of Noise Control* (New York: McGraw-Hill Book Co., Inc., 1957).

analysis. Furthermore, it is well known that any improvement or even change in working conditions may produce improved working efficiency due to improved morale. Consequently it is necessary to make some attempt at control for this factor, and this means at the very least that one should study one set of people whose noise exposure is reduced, and another set of people whose working conditions remain the same throughout the period investigated. Even this comparison is open to some objection since the group who continue to work in high intensity noise may not feel any improvement in morale due to the experiment, while the group working in reduced noise will naturally show such improvement. The suggestion has been made by Rosenblith *et al.*,[2] that ear plugs could be issued to workers, some of the plugs being defective so that they would not in fact reduce the noise to which the wearer was exposed. This would in fact be an investigation similar to that of a drug studied with a placebo, but so far no such investigation appears to have been reported. The reason is probably that ear plugs are not usually industrially acceptable when other methods of noise reduction are available.

Failing this type of control of morale factors, it is possible to draw some conclusions from a study in which the same people work both in noisy and in "quiet" circumstances. The interest taken by the management in their working conditions as shown by expenditure on acoustic treatment, may lead to a rise in morale. This in turn may lead to an improvement of working efficiency which should be shown as much in the noise as in the quiet. The present study concerns such a comparison. A situation was found in which one work place could be acoustically treated while another, in which the same people sometimes worked, was not. In addition, the type of work was one in which brief failures of perception would produce measurable results, and in which the noise level before sound treatment was above 90 db, but might be expected to fall below that level after treatment. Thus the situation provided an unusually suitable opportunity of studying the effects of noise reduction, and an investigation was initiated.

Procedure: The Situation Studied

In the production of movie film, the perforations down the sides of the film are inserted at a stage after the film has been coated with emulsion and cut into its final width. The operation is carried out by machines which are loaded rather in a similar way to the loading of a cine projector with film; that is, a reel is placed on the machine and the film threaded through a moderately complex pathway. The machine is then started

[2] W. A. Rosenblith *et al.*, Vol. **II**, U.S.A.F. WADC Technical Report 52–204, 1953.

and proceeds to make the perforations until the whole reel has been finished. While the operation is proceeding, the operator loads other machines. An incentive payment scheme is used, so that he attempts to keep all machines under his charge running as much of the time as possible. For the purposes of payment, the rate of work is recorded. The task is, however, sensitive to any momentary lapses of attention on the operator's part since, if he makes a mistake in threading the film, he is likely to have a breakage of the film, or other breakdown of the machine. These stoppages also are recorded. The operation is carried out in a reduced and controlled illumination, because of the need to protect the film emulsion. The temperature also is controlled.

In the particular plant studied, there were two inter-connected rooms, usually involving about five operators, in which there was a dim safelight. There were also other rooms involving roughly the same number of people in which there was practically no illumination whatever. Acoustic treatment was carried out in one of the former rooms. Noise in this room was measured in a number of positions before treatment was carried out, using a Dawe sound level meter Type 1400b. When all the machines were operating the level was at least 98 db in all parts of the room and 99 db in the middle of the room amongst the machines. Examination of the noise with a Dawe frequency analyser showed that there were peaks in the spectrum at approximately 80, 175, 250, 500, 700, 1,900 and 7,000 c.p.s., all reaching approximately the same level ± 2 db.

The room was treated by placing absorbent material on the walls and ceiling and by putting absorbent baffles between the rows of machines. As a result of this treatment, the level fell by about 8 to 10 db in all positions measured, the final level in the position which gave 99 db originally being 89 db after treatment. Unexpectedly, it was also found that a reduction in noise level had occurred in the interconnected but untreated room, the initial and final levels being 98 and 90 db respectively. This frustrated the original intention of using comparisons of the inter-connected rooms as a principal source of data. However, the other rooms operating with, in effect, no illumination, still provided a control in which noise level had remained unchanged.

Types of Measurement Made

1. Communications. While it is generally accepted among students of hearing that noise interferes with the understanding of speech, one occasionally meets people in industry who feel that persons accustomed to a particular job in noise are nevertheless able to understand speech in that noise. Although it is usual to attribute this feeling to the development of lipreading and other non-auditory forms of communication by workers in noise, it is perhaps conceivable that under conditions of pro-

longed exposure a man might come to understand speech by cues which fall outside the frequency band of the particular noise in which he works. It was therefore thought worthwhile to conduct intelligibility tests in the work-place before and after the acoustic treatment. The technique adopted was to use a tape recording of one of the lists of monosyllabic words, compiled by Hirsh *et al.*[3] in two different orders. Groups of five or six operators stood against the wall of the perforating room and listened to the tape recorder playing at a level which was kept constant for each group. They attempted to write down the monosyllables as they heard them. Two of these groups carried out these tests on two occasions before the soundproofing as a check on practice effects. They did no better on the second day, and it therefore appeared that with this type of listener under these conditions, practice was unimportant.

Unfortunately, at this stage, because a valve had to be replaced in the tape recorder, it was not possible to make direct comparisons with further tests. However, another two groups carried out the tests once before soundproofing and their results were compared with another two groups who did the tests after the soundproofing.

2. Measures of Working Efficiency. The sound treatment began to be installed during the annual holiday of 1957. Various measures of operator efficiency were extracted from the records for a six-week period following this holiday, and, for comparison, for the six-week period following the holiday in 1956. The period of six weeks was chosen because operators normally shifted from room to room in a systematic cycle of six weeks for reasons quite unconnected with the investigation. Each cycle involved the rooms in which the noise level had remained constant as well as those in which it had declined, so that by taking this period we should eliminate differences in ability between individual workers from any comparisons made between different rooms. Figures were obtained separately for each "bay" (that is, each group of machines controlled by one operator) for each shift. No very noticeable difference appeared between shifts, and therefore the results for all shifts in each bay were combined.

Succeeding six-week periods were examined in the same way, except that the periods involving Christmas 1956 and Christmas 1957 were excluded. In all, four pairs of six-week periods were studied, each pair comprising one before noise reduction and one after. We may thus compare performance in 1956/7 and 1957/8 for five bays in which a noise reduction of about 10 db occurred at a time immediately before the 1957/8 period. A similar comparison can be made for four other bays in which

[3] I. J. Hirsh, H. Davis, S. R. Silverman, E. G. Reynolds, E. Eldert, and R. W. Benson, "Development of Materials for Speech Audiometry," *Journal of Speech Dis.*, 1952, pp. 321–37.

no noise reduction occurred. The measures of working efficiency taken were as follows:

(*a*) *Point Hour.* This is a measure of rate of work during those times in which no stoppage of work has occurred. It is calculated for purposes of the incentive payment scheme. When a stoppage occurs, the operator is paid on time rate.

(*b*) *Number of Broken Rolls of Film.* These were divided into those attributed to the operator and those due to some other cause such as the machine. Records of both were examined since it is of course possible that some change in classification might have occurred during the period.

(*c*) *Number of Shutdowns of the Process Other than for Broken Rolls.* Here again stoppages attributed to the operator were distinguished from those not so attributed.

(*d*) *Number of Calls for Maintenance Assistance.* It was considered possible that operator error might cause breakdown in machines, and this index was therefore examined.

(*e*) *Time Occupied by Stoppages for Maintenance.* If the curing of faults took longer when working in noise this measure might be expected to show some effects.

(*f*) *Labor Turnover.* This is hardly a measure of working efficiency, but was obtained on the same basis as the other measures mentioned since it seemed probable that it might reflect a change in working conditions.

(*g*) *Absenteeism.* This also was thought to be a possible index of effects of noise, since one frequently encounters the opinion that noise produces minor illnesses and nervous complaints, and the incidence of absenteeism was therefore determined on the same basis as the other measures.

Results

1. Communications. The subjects who listened to the tape recordings after sound treatment correctly identified 69% of the words in the recordings. The separate group of subjects who heard the recordings before treatment identified correctly only 54% of words. The difference is significant at the .05 level by a one-tailed test using the tau method.[4] The difference is also of much the same magnitude as that to be expected from laboratory experiments on intelligibility in noise, so that it suggests that workers used to noise still benefit from the noise reduction.

2. Measures of Working Efficiency. The more important measures are shown in Table 1.

(a) *Point Hour.* It will be noted that the point hour, that is, the rate

[4] J. W. Whitfield, "Rank Correlation between Two Variables, One of Which Is Ranked, the Other Dichotomous," *Biometriks,* Vol. 34, 1947, pp. 290–96.

of work, increased following the acoustic treatment. However, it did so in the untreated bays just as much as in the treated ones. The difference between bays is completely insignificant ($p > 0.5$). Thus it does not seem possible to ascribe the improvement to an effect of noise on working efficiency. On the other hand, all the bays, whether treated or untreated, showed improvement in point hour so that there has undoubtedly been some change in the conditions of work between 1956/7 and 1957/8. This might conceivably be due to general factors such as the economic situation of the country, or the flow of orders through the department of which perforation formed a part. However, as a precaution, the point hour was examined for all other workers in the department, excluding the perforators. There had been a significant fall in point hour amongst these other workers; which does not suggest that factors of the sort mentioned could be responsible for the improvement of rate of work in the perforators. A plausible explanation is that the reduction of the noise improved the morale and attitude to work of the group studied, and that this effect naturally appeared in whichever bay they were working. The presence of the control, untreated, bays has however saved us from interpreting this morale effect as one due primarily to noise. From the point of view of the practical management of work it may, of course, be quite helpful to have an increase in rate of work from noise reduction even though this is really due to an improvement of morale.

(b) *Broken Rolls of Film.* It will be seen that the number of film breakages has also declined since the 1957 holiday. However, in this case the decline has been much greater in the acoustically treated bays than in the untreated ones. The statistical significance of this difference is perhaps best assessed by again examining each individual bay, deciding how many of the treated bays showed bigger reductions than the untreated ones, and calculating tau. By this method the difference is significant ($p < 0.05$). It thus seems clear that momentary inefficiencies on the part of the operators have been reduced by the treatment. In view of the main purpose of this investigation, to study long term trends in working efficiency after noise reduction, the individual six-week periods were examined for any sign of a "wearing off" of the effect of noise reduction as time went on. There was no sign whatever of such a "wearing off"; the largest difference between six-week periods was that for the third period, closely followed by the fourth. The second period gave a smaller difference, and the period immediately following the first noise reduction gave the smallest difference of all. (To some extent this tendency for the effect to increase with time may be due to the fact that not all the acoustic treatment was installed during the 1957 shutdown, and some of it was put in after the first six-week period. But this cannot explain the whole trend.)

It will be noted that the entries in Table 1 are only for those broken

rolls which were attributed to the operator rather than to factors outside his control. Figures for the other types of breakage were also examined, and showed a slight but insignificant difference in the same direction. It would be surprising if noise reduction had affected breakages due to factors other than human error. A change in the method of attributing broken rolls to operators and to other causes might have occurred after the acoustic treatment to the bays. The slight effect in the number of breakages is important as it means that the main results cannot be explained as due to a change of this nature.

Table 1. Comparison of Acoustically Treated and Untreated Work Places before and after Treatment Was Carried Out

	Treated Bays		Untreated Bays	
	1956/7	1957/8	1956/7	1957/8
Broken rolls (attributed to operator)	75	5	25	22
Other shutdowns (attributed to operator)	158	31	75	56
Calls for maintenance (excluding first six week period in each year)	746	597	516	468
Point hour	84.5	89.6	91.2	95.25
Absenteeism (time as % of possible hours worked) ..	5.18	4.43	2.72	1.56
Labor turnover (Mean % per six weeks)	1956/7 = 6.2%		1957/8 = 0	

(c) *Other Shutdowns.* Other types of shutdown again showed a greater reduction in the acoustically treated bays than in the untreated ones, although the statistical significance of the difference is not quite so satisfactory using the same test as previously ($p < 0.10$ by a two-tailed test). Thus this finding can only be regarded as established if we feel that the laboratory experiments give us sufficient grounds for expecting reduced human error after noise reduction. As before, the effect increased with increasing time since the beginning of the period studied, and it was slightly in the same direction when shutdowns not attributed to human error were examined.

(d) *Calls for Maintenance.* Although there was slightly greater reduction in the number of these calls in the acoustically treated bays than in the untreated ones, which again agrees with expectation, the statistical significance of the difference is quite unsatisfactory ($p > 0.5$).

(e) *Time Occupied by Stoppages for Maintenance.* This did not appear to show any effects.

(f) *Labor Turnover.* As will be seen, there has been a reduction in

the number of staff leaving, but this is too small to be confidently regarded as more than a chance effect. The data have been examined to make sure that the other findings could not be explained on the basis that more highly skilled workers took the place of those who left.

(g) *Absenteeism.* There has been a slight reduction in time absent from work, but this appears both in the acoustically treated and in the untreated bays. The difference between bays is actually in a most unlikely direction, the reduction being greater in the untreated bays, but this difference is, of course, completely insignificant. It may be of possible importance that the remainder of the department, excluding the perforators, showed a slight increase in absenteeism during the same period. The same morale factor may therefore be at work.

Discussion

The results of this investigation completely agree with those of the laboratory experiments mentioned at the beginning of the paper. The rate of work is not improved by noise reduction, except perhaps by a general morale factor; human error is, however, less frequent when the noise level is less. There is no sign that the effects found with these experienced workers are less than those met on the much shorter time scale of the laboratory. Indeed the actual difference shown in Table 1 are larger than those met in the laboratory experiments to such an extent that enquiry was made to see whether any other factor could possibly be intruding and producing a spurious effect. For example, the acoustic treatment might have been introduced at the same time as a change in lighting sufficient to alter the number of errors. However, no change in other working conditions was found which could, by itself, have caused the results obtained; and the most probable explanation for the very substantial effects in Table 1 is that the effect of the noise interacts with some of the other features of this job such as the low illumination. The effect of noise reduction may therefore have been greater than it would have been with a job performed under more normal conditions. Another point which should be borne in mind when observing the reduction of, for example, broken rolls, is that the breakages attributable to the operator are naturally only a small proportion of the total breakages which occur. Thus one cannot say that noise reduction will produce an economic advantage as great as might appear from this table. Lastly, it must be borne in mind that although we are certain that chance factors are not responsible for producing the reduction in broken rolls, they may have made that reduction appear somewhat larger in these results than it would if another set of observations were to be taken.

While therefore one must not place too much weight on the actual size of the improvement in efficiency achieved by noise reduction, the

agreement in the form of improvement found in actual work and in the laboratory experiments is impressive. Noise does produce human error in a real-life situation, even among people who are used to it.

2. Time on Their Hands *

Robert D. Meade

The workers' steady and involuntary march toward insignificance which has been going on since early in the industrial revolution, seems to be accelerating with each new technological achievement of mass production. The demise of the craftsman and the simultaneous relegation of individual workers to roles of minor importance in the total scheme of the manufacturing process has greatly diminished many of the satisfactions which were formerly derived from creativity. It is believed by many that this situation has resulted, with ever-increasing complexity, in serious problems of employee morale which have become more acute as business and industry put into practice the latest devices of automation.

Improvements in morale in such business operations has received considerable study and discussion and numerous methods have been proposed to deal with the problem. New and complicated incentive plans have been proposed, employee counselling instituted, group decision techniques adopted along with many other morale improvement programs of varying merit and feasibility. All of these plans have as their ultimate goal an alteration in the subjective feelings of the worker toward his work or personal environment. A major aspect of these subjective feelings, yet one largely ignored, is the way in which employees experience the passage of time while on the job. It would appear that a day which seems interminably long would accompany a climate of poor morale while one which seems to pass very quickly would be characteristic of a good morale atmosphere.

Shortening the Work Day. Labor has constantly called for a shorter work day. The eight-hour day, only a dream of the embryonic labor union eighty years ago, is now considered by many to be excessive. Experiments have shown that shortening the work period tends to give a considerable boost to morale as well as increase in the level of production. Still other investigations have shown that many workers actually prefer a shorter

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work day to an increase in their pay checks. Add to these facts such everyday occurrences as work stoppage and clock watching long before the whistle blows and one can well appreciate the apparent importance of time as it is viewed both in the offices and on the assembly line.

This paper does not propose to deal with the relative merits or disadvantages of the shorter work day or any of the problems hoped to be solved by its introduction. Instead, the question of changing the *apparent* length of the work period will be considered. What kinds of situations make time seem to be long in some conditions and short in others? How are these factors related to other problems involved in the creation of good morale? To what extent could morale be improved by making an ordinary eight-hour day actually seem shorter to the factory worker or office clerk? This paper will confine itself primarily to the first of these questions but will also have some suggestions about the answers to the others as well.

Distorting the Time Process. William James made the rather elementary observation that when one wishes time to pass rapidly, it seems to drag and when one wishes it to go slowly, it seems very short. Probably because it is such a common observation, it was only recently that this proposition was put to an experimental test. The results, although rather limited in scope, seem to agree with James' conclusion. Indeed, the experimental study of factors which distort the experience of subjective time—making it go fast or slow—has been going on for only a few years. Yet, in spite of this, some fairly precise conclusions about the time process as well as ways of distorting it have begun to emerge.

It has been known for some time, for example, that empty time in which the individual does nothing seems longer than time occupied with various kinds of activities. New activities seem to take longer than more familiar ones whose objective times are the same. Time spent on mentally difficult tasks seems to be shorter than the same amount of time spent on easy ones. A period of time spent on one long task seems shorter than an equal period spent working on several smaller tasks. Surprisingly enough, however, experimental evidence does not seem to support a very common belief that periods of time spent in unpleasant or painful situations seem unusually longer than periods spent in more pleasant activities.

Recently, attention has been turned to the relationship between aspects of motivation and subjective time. Hindle has studied subjective time which individuals experience while working on tasks whose goals are vague and poorly defined compared with tasks whose goals are clear and specific. Her findings quite clearly show that time estimates increase but at a slower rate as one moves through a task where the goal is clearly defined and more rapidly when the goal is vague. Thus, an individual working on a task with a clear goal for five minutes will experience time

as shorter than one who is working the same length of time on a task with an undefined goal.

Relation between Time and Progress. Hindle believes that when an individual has a goal clearly in mind, it is possible for him to see changes in progress toward that goal to a greater extent than when the goal is unclear. Hindle has proposed that distance, rate and time in the *subjective* sense are related in essentially the same way as distance, rate, and time in the objective sense as used by the physicist, i.e., rate equals distance divided by time. If this is true, then apparent time should be inversely related to rate of progress and will be short when progress is fast and longer when progress is slow.

This thinking has been developed and explored further in studies of the experience of time at the Laboratory of Psychology at Trinity College.[1] In the first of these studies, the motivation of the individual who was being tested was made the chief target of study. It was believed that Hindle's theory that apparent time is distorted by the experience of progress toward the end of the task would hold in some situations but not in others. The particular hypothesis to be tested was that motivation to reach a goal on the part of the person being tested was necessary before experience of time would be altered by experienced progress. The reasoning behind this was essentially that when a person is motivated to achieve a certain goal, various cues and events in his environment take on significance for him while at the same time other cues become inconsequential and are likely to be overlooked. It is like a man who, searching for a cuff link in a dresser drawer, may take special notice of any glittering object which he sees there and at the same time fail to notice that his wife's hairpins are also there.

It was proposed that unmotivated people would fail to react to cues concerning progress toward certain goals and that their time experience would be unaffected by progress toward these goals.[2] At the same time, it was believed that when a person is in a state of motivation to reach a particular goal, experienced time would show the inverse relationship to perceived progress predicted by Hindle. Subsequent experimental investigations supported these beliefs. The kind of motivation that was employed here was the desire to be relieved of having to participate in some lengthy and boring tasks which would have to be done as the experiment progressed. Additional studies have indicated that other kinds of motivation seem to produce the same kind of effect.

The Role of Motivation. Another finding in these studies showed that experienced progress toward a goal has a greater effect on time experi-

[1] These investigations are supported by a research grant, M-3193, from the National Institute of Mental Health, Public Health Service.

[2] The words "goal" and "progress" will be used here even though their meaning may appear to be inconsistent with a situation where there is no motivation.

ence the closer one is to attaining the goal. If a person has finished, for example, eighty percent of a task, experienced time seems shorter for the same rate of progress than if he has finished only twenty percent. This has been explained by a principle known in psychology as the *goal gradient*—the general notion that a goal becomes more attractive or motivation becomes stronger as one gets closer to the goal. This again points to the great importance of the role of motivation in apparent time.

While motivation was found to be a highly significant factor in altering the length of subjective time, the mere presence of motivation alone has been found to be ineffective in altering this process. Placing a person in a situation where he is highly motivated to reach a goal with that goal clearly defined yet depriving him of clues relevant to progress toward the goal results in no alteration of his feelings about elapsed time.

Thus it would seem that factors necessary for changing the apparent length of a period of time are, 1, the presence of some definite end point in a task toward which an individual is working, 2, motivation to reach the end point or goal, and 3, feedback of information from the task itself in reference to progress toward attaining the goal in question.

Most of the studies discussed thus far have been made with relatively short periods of time. Experiments are currently being conducted, however, which seem to show that the same general principles hold for much longer periods of time as well.

Still other experiments in this series will investigate the effects of certain more or less permanent personality factors related to motivation on subjective time. It is suspected that some individuals, such as those who have a high need for achievement, may be influenced to a greater extent in situations like those described above than others who have a lower need to achieve.

People utilize several different sources of information about their progress through a given activity. In some cases, progress is apparent from the actual task itself while in others, a person must be told the extent of his advancement indirectly or by someone else. Some of this information may come to the person through hearing, some through vision while still more could come through the muscle and skin senses in some activities. The effectiveness of various ways and combinations of ways in which people receive progress information in a given activity is also being tested.

Other Factors Being Studied. Still other studies will investigate the different effects of progress achieved by skill as opposed to that achieved by mere chance factors. The effects of negative or avoidance motivation and backward progress or progress away from a goal will also be included in the series of experiments to be done.

The significance of this research program for improving the morale of workers in business and industry is, of course, to a great extent un-

tried and unknown. Adapting psychological principles discovered in the laboratory to practical situations always presents considerable difficulty and one has to be cautious in extending generalizations to the production line from the ivy-covered psychological laboratory. However, it is immediately apparent that most of the factors found to be significant in distorting apparent time are those already known to be important in industrial morale and motivation.

For example, a study reported from Great Britain demonstrated effectively that workers prefer jobs which have well-defined and worthwhile goals. It was also shown that production was higher and financial incentive plans more effective on these jobs than on those whose activities were viewed by the worker as being worthless. Another study, also in England, showed output to be higher when the worker could see his daily output (progress) piling up beside his workbench than when it was periodically whisked away never to be seen again. It appears therefore, that factors which influence motivation and morale are necessarily interrelated to those of time experience.

It is not at all uncommon to hear workers say such things as "I thought the day would never end," or "It seems like I've been here all day, but it's not even lunch time yet," or more happily even if more rarely, "The day went by so quickly—it seems like I just got started." The problem of subjective time as it is experienced by the worker, then, is one which seems to be of some magnitude. To what extent it can be manipulated to the worker's advantage and that of his employer is worthy of consideration.

3. The Psychological Definition of Jobs *

Mason Haire

The *Dictionary of Occupational Titles,* the practices of official bodies such as the United States Employment Service, and the hiring customs of personnel offices have led us to rely on a very excellent set of definitions of jobs which are admirably complete in many ways, but which studiously avoid the psychological character of the job. These definitions and breakdowns of jobs tend to describe them in terms of the duties per-

* From *Psychology in Management,* by Mason Haire. New York: McGraw-Hill Book Company, Inc., 1956, Chapter 7, "More Complex Problems," pp. 169–176. Reprinted by permission of the publisher and author.

formed and the skills and tools used on the job. For many managerial purposes, these are not sufficient description, and we need to look at other factors for definition.

The classical studies of the Hawthorne plant of the Western Electric Company offer an example of the role of social factors on the job. The investigators in this study began with the sober academic aim of finding "the relation between conditions of work and the incidence of fatigue and monotony among employees." Following the lead of technological definitions of conditions of work, they first planned to vary such factors as operating conditions (temperature, humidity, and the like), rest pauses and work schedules, and wage-payment plans. They picked a group of operators out of the line and began to study their performance. Immediately an important phenomenon occurred. The simple fact of being picked out for study and attention made a tremendous difference to the performance of the operators. As the research workers put it, "a gradual change in the social interrelations among the operators themselves and between the operators and the supervisors (appeared). From the attempt to set proper conditions for the experiment, there arose indirectly a change in human relations which came to be of great significance."

As the investigators began to vary the work schedule, looking for its effect on output, it soon became clear that, in addition to the fact of rest pauses, the output was influenced by the fact that the operators "had become participating members of a group with all the psychological and social implications peculiar to such a group." When they went on to vary the manner of incentive pay, it was finally concluded that it was "only in connection with the interpersonal relations at work . . . that its (the wages') effect on output could be determined." In all cases it was clear that the technical and logical analysis of the job was leaving out a group of important determinants of productivity—the people themselves and their relation to one another and to their jobs.

Examples of the importance of the worker's relation to his group as a determinant of industrial efficiency are not hard to find. Earlier we have discussed the effects of longwall coal mining on output in British mines. Here a change which was technologically efficient was severely limited in its effectiveness because it cut across and partially destroyed the group organization that had supported many of the motivations important on the job. While this is a negative example of the harmful effect of failure to recognize this kind of psychological definition of the job, the other side of the picture can be seen in certain management policies in the same situation. Industrial safety had long been a problem in these mines. Accidents had gradually increased over a period of years, and it was felt that the disruption of social groups occasioned by mechanization might be a partial cause of the increase. Where safety depended on an awareness of intergroup dependence, and on each man's responsibility for

the working conditions left for others, the loss of close group feeling might easily lead to accidents. In an attempt to correct this, management took steps to rebuild the social organization of the work groups outside the mines. The company sponsored off-the-job concerts and vaudeville acts, group trips to Glasgow and Edinburgh for football matches, informal parties, and the like. In addition, company meetings emphasized the interdependence of the shifts and the social organization of the whole mine group. Over a period of more than a year the accidents in mines handled in this manner decreased by 5 per cent in comparison with similar units which did not have the new policies. It seems quite possible that the sensitivity to social factors on the job can be utilized effectively by management to correct existing evils. We do not need to be confined to a passive awareness of their restrictive effect on output as they operate silently on the job, but by a suitable awareness and action, their beneficial aspect can be exploited.

The study of psychological factors in the definition of the job is not confined to social influences of this sort but should also include individual considerations of the way in which the individual sees himself and his job. We have already mentioned the surveys made on automobile assembly lines in which most of the respondents indicate dissatisfaction with the skill required of them; they felt that they liked the work at their last job better than this one but that the pay was so good on the production line that they couldn't afford to pass it up in favor of a job where they could commit themselves more wholeheartedly to the work.

The organizational and technical construction of the job may mask factors which seriously hamper the individual's effectiveness. Whyte's *Human Relations in the Restaurant Industry* provides an excellent example. As a restaurant grows and the work load of a waitress becomes heavy, it is quite common to add a new job to the production organization. A counterman is often put in between the waitresses and the cooks, to handle the orders, relaying them to the cooks and holding them for distribution to the waitresses. In an expanding operation this surely seems like a logical and intelligent addition to the system. However, this part of the business is typically the locus of emotional blowups, turnover, grievances, and a host of personnel problems. What is there in the job that makes it the source of problems? In many ways the counterman is in an unusually difficult position. The waitresses can be expected to put pressures on him to supply orders for their customers. Since this service is obviously the reason for the business, he cannot be insensitive to their demands. The cooks, on the other hand, will tend to ignore the pressures of the counterman, and since the cook is of higher status and in no way subordinate to the counterman, there is no way to implement the pressures. The counterman is apt to find himself subjected to constant pressure with no way to do anything about it. Add to this the fact that

the counter position is ordinarily filled by a man, while the waitresses are women, and the problem becomes harder. The normal societal sex roles are reversed. The woman is in an aggressive demanding position, asking for service, while the man is in a passive acquiescent role with little control over the situation. When these aspects of the job are considered, it is no wonder that this spot is a source of much disturbance. Without considering these things, it makes little sense to define the counterman's job as "takes orders from the servers; relays them to cooks; keeps completed orders hot until they are called for; distributes them to servers." The sterile standoffishness of such an objective description of the job completely fails to specify its real requirements or to give any hint of the kind of management problems it may contain. It is quite possible to define jobs this way, but it may be misleading.

When we begin to go beyond a description in terms of the skills and duties and tools required, it opens a group of questions about jobs. Are aviation metalworkers like tinsmiths because they both work with metal and use similar tools in forming and fabricating, or are the two jobs different because the men in them see them differently? In a period of national mobilization, where it may be necessary to shift workers radically from one job to another, it may be important to know what this psychological commitment to the job is, in addition to the simple facts of tools and skills. Within an organization, the same kind of factors occur. A storehouse keeper or the man in charge of the tool crib must maintain an inventory control and keep items available for distribution. However, he must do some other things, too. The most frequent source of difficulty about these jobs comes from the incumbent's dealing with the people who must get things from him. He may hoard items to keep his stock high; he may delay service because he is worrying too much about his inventory-control record keeping. The real success of his job depends on the way he sees himself and his job and the people he works with. These factors set standards he must meet, and they may add psychological barriers to his job, but they are rarely included in the job description. Whoever heard of a job analysis that, in addition to reading "sorts tools as they come in; maintains stock records," and so forth, includes "must be able to make others happy even though he does not have the tools they want"? Similarly, the cashier in a restaurant has many of the functions of an accounting clerk, but balanced books may not entirely account for her success on the job. The requirements of the job go well beyond this, and they need to be recognized. These are casual scattered examples, and they are cases in which the psychological characteristics of the task are relatively obvious. The same kind of problem exists in most other jobs, although it may take more of a look beneath the surface to see it, and this look often needs to be added to management's view of its organization.

These psychological aspects of the job probably spread throughout industrial problems. We have mentioned productivity and safety. They turn up in other areas, too. An investigation of turnover in British metal-fabrication plants leads the research workers to suggest that the turnover process could be profitably broken into three psychological stages. The high peak of turnover at about six months, which is characteristic of so many businesses in this country, was, they suggested, typical of what they called "the induction crisis," in which the new worker's view of the job and of himself had gone far enough so that a new decision was necessary about continuing. A little later in employment, a very different rate of turnover seems to characterize the employees, during a period of "differential transit" where they have passed the first hurdle of deciding about the job but have not gone on to the third state of "settled connection." These periods and the different rates of turnover that characterize them are not unlike the stages that seem to typify the development of a marriage and the different rates of divorce that are typical there. The similarity is not only analogous; in both cases it is a process of coming to know the other partner and of seeing what is actually involved in the relationship. In the case of turnover, it seems likely that, apart from many externally determined causes for leaving, an understanding of the psychological meaning of the job for the worker would lead us to an improved grasp of the problem of turnover and to the possibility of some effective remedial actions.

In other areas, too, we can profitably consider the psychological, rather than simply the "objective," factors in the situation. Already there has been some indication that these considerations improve our understanding of consumers' economic behavior. The surveys of the Federal Reserve Board indicate that saving and spending cannot be understood simply in terms of the amount of the consumer's income. In order to make sense of the data they have collected, it is necessary also to take into account the amount of income he had last year and the amount he hopes to have next year. The consumer's expectations (a purely psychological affair) must be weighed along with the objective information about his income. The area of union growth and labor management relations, also, seems likely to be an area where an increased attention to psychological variables will broaden our understanding. Much of the initial drive which made organization possible must have come from a deficiency or deficiencies in the satisfaction of needs afforded by the job, and the present growth and direction of activity may be more clearly seen with this background in detailed focus.

What can management do about it? The first requisite seems to be a heightened sensitivity to the kind of factors that have been illustrated here. This awareness can lead to a better understanding and to the utilization of this understanding in many areas of managerial responsibility. In

the design of equipment it is possible to keep the requirements of the operator more clearly in mind than has been customary in the past. In the design of jobs and their organization into a plant, it is necessary to take into account such things as the size of the unit that is a single worker's responsibility, the kinds of contacts he will have, and the rate of growth and expansion of opportunities (other than promotion and wage increases) that he will have. An adequate psychological definition of the requirements of the job will raise the accuracy of selection for a particular job, as these factors act to cut out those who have requisite superficial skills, but lack the other requirements. After a man is on the job, it will be possible to make minor modifications in duties, rates, contacts, authority and responsibility, and the like, to tailor the job to the individual in its psychological aspects. Management's job will always be one of understanding the job the worker sees, so that it is possible to exercise the leadership required. In many cases it has been customary to see the job either as the manager himself once did it, years ago, or else as it has been described with the studied objectivity of the industrial engineer. Both of these may have real meaning for the manager, but the final determinant will be the job as the incumbent sees it, and the meaning of the job to him. As we approach an understanding of this problem, our techniques of leadership will approach the level of technical excellence that characterizes the growth of American industry.

4. Positive Aspects of Motivation in Repetitive Work: Effects of Lot Size upon Spacing of Voluntary Work Stoppages *

Patricia Cain Smith
Charles Lem

Modern technology has produced a large number of very simple and highly repetitive motor tasks. This technology has also devised many ways by which workers can be motivated to perform these tasks by the introduction of incentives which are not psychologically a part of the tasks themselves. Consequently, one might assume that the average operator finds little of interest in these tasks themselves, and that continued

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performance during any one time period might be due solely to incentives, either social or economic, which are external to the task.

Recently it has been emphasized that there are very real internal incentives which develop as a result of the continued performance of a task, even in unskilled repetitive work. A British economist, W. Baldamus (1, pp. 1–15), has described and labeled one such factor "batch traction." He describes batch traction as an involuntary relationship between a worker and his task which "mildly urges" an operator to work through or to finish a bundle, a group of units, or a lot before taking a voluntary rest period. Batch traction is only one of a general class of positive factors in work which he calls traction. "Traction is, in a sense, the opposite of distraction. It is a feeling of being pulled along by the inertia inherent in a particular activity. The experience is pleasant, because it is associated with a feeling of reduced effort. It . . . is the most characteristic experience in industrial occupations" (1, p. 42). The concept of a need to complete a task is scarcely a new one to psychologists; Baldamus' comments are unusual in that they describe a positive, pleasant relationship between a task and the person who performs it.

If these mild positive factors do exercise an influence upon workers in repetitive tasks, it is clear that they should be maximized to reduce effort and conflict for the worker and possibly to make his work more satisfying. It is possible, moreover, that eventually such decreased effort would be reflected in decreased absence and turnover and even in increased production.

From the description Baldamus has given of batch-traction effects, we should expect them to be greatest when the lots are large enough to constitute an easily grasped psychological unit, and they should reduce as lots become so large that the worker has the end of a lot in sight for only a small percentage of the time. Reduction of very large lot sizes should, then, increase the effects of batch traction.

Several criteria have been used in previous studies of the effects of lot sizes, or suggested themselves here:

1. Introspection by educated persons, such as Baldamus, who have engaged in repetitive work. This evidence may be criticized on the grounds that such observations may not be typical of those of workers accustomed to production work.

2. Expressed preferences of workers for smaller lots when they have been introduced in the course of other experiments (9). The effects of suggestion on the one hand, or of resistance to change on the other, could not be even partly controlled in such studies without the use of prohibitively long periods of experimentation. Both effects seemed likely to be important in this situation. Data concerning preferences were gathered as supplements to other criteria in the present study.

3. The over-all shape of the work curve (9). The evidence of the ef-

fects of lot size based on this index was not considered conclusive, and the index was eliminated from consideration in this case because such curves are often found to be unreliable, and judgment of their shape is highly subjective (7).

4. An increase in the output toward the end of each lot would be a less subjective index of traction effects, but in most factor situations in which experiments could be plausibly carried out, such changes could be attributed as well to differences of ease of handling work from a nearly empty tray or from a nearly full one. This index was also eliminated.

5. Changes in total production with changes in lot size. Previous studies (4) using this index have been limited because such factors as amount of experience on the task (2, 5), and fear of work shortages, changes in methods, and alternation of jobs (4) were not controlled. Even when these factors have been controlled, however, the changes in total production are satisfactory indices only if workers are not restricting their production to a set figure. These changes, moreover, are almost as susceptible to the effects of suggestion, positive or negative, as are verbal reports. Restriction was clearly evident in all departments available for this study, as evidenced by extremely small variability from time to time and from worker to worker, and by verbal reports of foremen and workers. Therefore, the relatively mild effects of batch traction could not be expected to result in production increases except over very long periods of time.

6. Personnel records, such as absence, tardiness, and accident records. These are unsuitable because they are unreliable over short periods of time.

7. Frequency of voluntary work stoppages. This appeared to be the most flexible, objective, and reliable criterion of the effects of batch traction. We predicted that workers experiencing batch traction would tend to wait until they had completed a lot before taking a voluntary break, and that workers not experiencing traction so strongly would tend to take more frequent rest pauses throughout each lot. Thus, decrease in frequency of pauses and its correlate, increase in length of time worked between stops, would be taken as indices of increases in batch traction effects.

Choice of Operations for Study. Changes in effects of batch traction should be most easily observable in work which is light and repetitive, and in which the workers are accustomed to very large work lots. The social conditions of the departments involved should permit rather free variation in spacing and frequency of rest periods. For more general applicability, more than one job should be studied, preferably with similar cycle times. These conditions were remarkably well satisfied by two jobs performed in a small department in a medium-sized metal-working firm.

Three nearly identical filing operations and one straddle-milling operation were selected. We analyzed the records of all of the operators

who remained on either job throughout the experimental period; there were five on filing and four on the milling operation.

Both operations were light and repetitive, were paid by piece rate, and had closely similar cycle times. The department which was selected permitted the operators to take voluntary rest periods at almost any time without management intervention. Both jobs required the girls to procure their own work, which was normally supplied in tins containing 3,100 pieces each and taking about four hours for completion. Finished pieces of the milling operation were drop-disposed. In the filing operations, they were brushed aside on the work bench, and placed in the tins after a large number had accumulated.

Experimental Design and Procedure. The experiment was explained to the workers as an investigation of the effects of lot size on fatigue. They were aware of the presence of the experimenter during all observations. All workers were observed continuously from the time of their last scheduled rest period until closing time, a period of 105 minutes. Whenever a worker stopped work, the time elapsed until resumption of work was recorded.[1] The worker was considered to be on the job only when engaged in the primary task of operating the machine. The time taken out for filling out production tickets, adjusting and cleaning the machine, etc., was included in the time stopped since these operations were for the most part under the control of the operator. The time for these tasks was assumed to be constant from batch to batch, on the basis of the time-study reports from the engineering department. Work periods of less than 30 seconds were not considered to be work periods for our purposes, being too short to engender any traction effects. These very short work periods were combined with the adjoining stopped periods to make one continuous stoppage. Similarly, times of less than 15 minutes between the last stop and the end of the day were also eliminated, since the stop at closing time was not under the control of the operator.

The plan of the experiment was to use three lot sizes, the very large size to which the workers were accustomed, a small size, and an intermediate one, presented in counterbalanced order with periods of adaptation preceding the recording of the effects of each change. As so often happens in factory experiments, a few modifications of the plan had to be introduced. The actual order is shown in Table 1. This order was followed for both tasks.

[1] Most of the observations were made by the junior author. Some were recorded by Mr. Thomas Turner, whose help is gratefully acknowledged. Observer differences were checked; they were usually small, and in no case could they have been responsible for the differences between conditions obtained in this experiment. The first observational period for each observer was eliminated from the computations.

In Conditions S and M, the work was counted by the foreman or by an hourly-paid worker, into small paper containers. Workers could take several of these at one time.

The small lot sizes were omitted in the reverse order of conditions be-

Table 1. Sequence of Conditions

	Pieces	Time per Lot	Adaptation Period	Observations
L_1*	3100	240 min.	Four hours of adaptation to observation Several years' adaptation to size	2 afternoons
S_1**	310	24 min.	Six days' adaptation to size	3 afternoons
M_1†	620	48 min.	Six days' adaptation to size	3 afternoons
M_2†	620	48 min.	Consecutive to M_1	3 afternoons
S_2**	310	24 min.	Omitted	0 afternoons
L_2*	3100	240 min.	One day's re-adaptation	3 afternoons

* "Large" lots.
** "Small" lots.
† "Medium" lots.

cause the foreman and some workers objected to these conditions on the grounds of the time required to change pans. Since this time could have amounted, at most, for the small-sized lots, to ten minutes per day, according to the time-study records, it seemed more likely that the objections actually reflected the foreman's dislike of having to have the work recounted for the experiment. Nevertheless, we thought it more important to secure continued cooperation in the final condition, with the large lots, and this second series with small lot sizes was omitted.

After expressing his objections to the reduced lot sizes, the foreman actually found them of such slight inconvenience that he forgot to restore the customary large lot sizes until the morning of the day preceding the first observation of the second period of large-sized lots. This delay eliminated the planned week of re-adaptation. Plant schedules made it impossible to delay further recording. Three periods of 105 minutes each were recorded with the large lot sizes at this time.

Results. Two indexes of change were analyzed. First, the number of stoppages for each worker for each 105-minute period of observation was counted; these figures were totaled and divided by the total number of observations, to give a mean number of stoppages for each worker per 105-minute period for each experimental condition. Second, for each individual, the median time worked between stops was computed for each experimental condition. The median was used as an index in this case since the distributions for time were badly skewed and a mean would not have been a representative index of central tendency for these distributions. Differences for each index were tested for significance by

Friedman's nonparametric chi-square test (3). To summarize the direction of these differences, arithmetic means of the individual mean numbers of stops, and of the individual median minutes worked were computed. The statistical treatment was based, of course, on the indexes for each individual, rather than upon these mean scores.

The results followed predictions exactly. The most frequent stops occurred for the large lots, the least frequent for the small lots, with the results for the medium-sized lots intermediate. Similarly, the average time worked between stops was greatest for the small lots, shortest for the large, with that for medium lots between. The difference in each case was significant at less than the 1% level.

TABLE 2. EFFECTS OF VARIATIONS IN LOT SIZE UPON WORK STOPPAGES

Size of Lot	Mean Number of Stops per 105-min. Period	Minutes Worked between Stops per 105-min. Period (Mean of Medians)
Large ($L_1 + L_2$)	11.06	6.57
Medium ($M_1 + M_2$)	9.01	9.51
Small (S)	7.94	11.41
ρ	.01 *	.01 **

* Distribution of individual mean number of stops for each experimental period tested by Friedman's ranked chi-square test (3).

** Distribution of individual median times for each experimental period tested by Friedman's ranked chi-square test (3).

On the basis of the evidence, the hypothesis remains tenable that there are mild positive relationships between the worker and light repetitive tasks, these relationships occurring without changes in external incentives such as piece-rate payments. This independence is substantiated by the constancy of the production figures on these operations where obvious restriction was practiced. No change in production occurred for any individual under any of the conditions, as indicated by production records.

The results are probably not due to suggestion or to desire to please the experimenters. All of the workers were interviewed after the experiment. Although they understood that the experiment was intended to help them, and presumably desired to cooperate, they did not have any idea of the results which were expected, nor even that frequency of stoppages was the primary behavioral variable being observed. Further evidence against effects of suggestion or desire to please is furnished by the strong and openly expressed dislikes for the small lot sizes. Only one operator preferred the small lots; most preferred the customary lots or lots intermediate between the customary and the experimental "medium-sized" lots. All workers reported that they had maintained constant output throughout the experiment.

There are several possible reasons for this lack of preference for the small lots, in which behavioral changes indicated that traction effects were at their maximum. One operator gave a plausible explanation of the dislike of the small lots on the basis of a history of association of difficult special lots and repair work with small-lot sizes. The resistance to change by the foreman and workers was also important. The dislike of planning the counting of the work on the part of the foreman, who was very popular with the workers, is probably even more important. The further possibility remains, however, that the pull to complete a batch of work is pleasant only when it is relatively mild, and that it may become irritating when it is comparatively strong. This interpretation is being checked by a further experiment.

Conclusions

1. Changes in size of lot were reflected in objectively observable changes in number and spacing of voluntary work stoppages.
2. The results of this experiment agree with the predictions made from the hypothesis of batch traction.

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5. Effect of Colored Illumination upon Perceived Temperature * [1]

Paul C. Berry

There is an almost universal tendency to speak of green or blue as "cool" colors, and of red or orange as "warm" (von Allesch, 1925). When colored lights are used to illuminate stage scenes, the "cool" hues give the audience the impression of a low temperature on stage, while the illusion of heat is produced by "warm" lighting (Ross, 1938).

Can a person's judgment of the temperature of the air around him be biased by the hue of his surroundings? Can this conventional association between colors and temperature be used to improve the comfort of individuals?

Despite anecdotal evidence that this is possible, the only experimental study with direct bearing on this question was conducted by Morgensen and English (1926). They asked subjects to judge the temperature of heating coils wrapped in paper of different colors. Subjects apparently judged the green ones as hottest.

Method. Because the use of the terms "warm" or "cool" for certain colors is so widespread, it seemed advisable to conduct the experiment so that subjects were unaware of the experimenter's interest in their judgments of comfort and temperature. Subjects were therefore instructed in a simple tracking task, and were led to believe that the experiment concerned the effects of colored illumination upon tracking performance. They were told that the special lights generated considerable heat, and were therefore asked to indicate by a switch when the temperature rose to a point at which they began to feel uncomfortably warm. They were led to believe that the experimenter needed this information to avoid having discomfort interfere with their performance on the tracking task. Shortly after they had turned on the signal switch, they were taken out of the experimental room for a rest while the room was cooled by exhausting the air from it. In fact, the light sources produced negligible

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[1] This work was conducted under contract with the Ford Motor Company, Purchase Order No. EP 104076-W, and is published by permission.

heat, and the heating was caused by electrical blower-heaters concealed in the room, thus providing uniform heating for all colors.

Five colors of light were used. Two "cool" colors, green and blue, were balanced with two "warm" colors, yellow and amber, and white light also was used. Each subject was given five tests, one with each color, with the orders of presentation counter-balanced so that at the completion of testing for 25 subjects, each color had appeared at each position of the sequence on five occasions.

Following these five tests (in which the subject was unaware of our interest in temperature judgments) the subject was shown samples of the five colors that had been used and was asked to rank them in order of the amount of heat they had transmitted.

Experimental Room. The tests were conducted in a specially constructed room 4′ x 10′, painted white. The ceiling of this room sloped from 8′ high at one end, where the subject was seated, to 5′ high at the far end, and was entirely covered by fluorescent lamps shining through removable filters and fluted glass diffusers. The tilted ceiling was used in order to direct the light directly toward the subject.

The experimental room was located within the PRA building, which is supplied with air conditioning maintaining the general ambient temperature of 72°F and 50% relative humidity. A large vented exhaust fan in the experimental room permitted removing the hot air generated during the tests, and replacing it rapidly with the cool air from the surrounding building. Heating of the room was provided by six 1,000-watt blower-heaters concealed in the room, controlled to produce a rise of 2°F per minute in the room temperature.

Measurements of temperature and humidity in the room were provided by wet- and dry-bulb remote-reading thermometers.

Irrelevant Task. A task was required that would appear plausible for testing with the different colored lights, that would require the subject to look at the lighting, and that would be sufficiently interesting to prevent boredom during the testing. For this purpose, an American Automobile Association auto-trainer, Model 3539, was used.[2]

In this auto-trainer, a standard set of automobile controls is used to direct the motion of a model car on an endless-belt roadway mounted in front of the controls and sloping upward away from the subject. This apparatus occupied the full length of the room. The low point of the sloping ceiling was immediately above the far end of the roadway, so that in looking down the road, the subject was forced to include a considerable area of the lighting diffuser in his field of vision.

Subjects were told that the experiment, which was being conducted

[2] The auto-trainer was kindly supplied by special arrangement with the manufacturer, Allgaier Shops, Inc., Arlington, Virginia.

for the Ford Motor Company, concerned the effect of colored lighting on "some of the skills related to driving." They were given some initial practice with the auto-trainer, and then were told that during the test runs an automatic scoring device would record all the occasions in which the model car ran off the roadway. They were told that their score would be calculated in errors-per-mile, so that they should drive slowly and carefully. In fact, no scoring procedure for the driving task existed.

Lighting Used. The entire area of the ceiling was covered with 18 daylight white (Champion F40-D preheat, 40 watts) and 18 blue fluorescent tubes (Sylvania F40-T12/B/RS preheat, 40 watts). The white tubes were used alone, or with the yellow, amber, and green filters, while the blue lamps were used alone to provide the blue source. Beneath the tubes were mounted racks for the inclusion of theatrical gels to provide the color during the yellow, amber, and green sessions, and frosted glass filters to provide an evenly lighted expanse across the entire ceiling area.

The gelatins were selected on the basis of appropriateness of color and approximately equal visual brightness when in place. Visual brightness was equated by the use of a Photronic Cell equipped with a Viscor Filter [3] which gives a response to different hues which closely matches the standard luminosity curve for eye sensitivity adopted by the International Commission on Illumination. The sources and filter for the five colors were as follows: white—unfiltered daylight fluorescent; blue—unfiltered blue fluorescent, dominant frequency 478 mμ; green—daylight fluorescent with Roscolene gel 9—43, dominant frequency 555mμ; yellow—daylight fluorescent, with Roscolene gel 9—6, dominant frequency 578 mμ; amber—daylight fluorescent with Roscolene gel 9—11, dominant frequency 588mμ.

The intensity of the four colored lights was approximately equal. Readings taken with a MacBeth illuminometer on the white surface of the roadway directly under the light diffusers indicated about 280 apparent foot-candles for the colored lights. The unfiltered white light taken at the same position produced a reading of 420 apparent foot-candles.

Duration of Testing. Subjects were told to expect about 1½ hours of testing. The duration of the test for a single color ranged from 4 to 29 minutes. Between the separate colors, the subject was returned to the outer room (lighted by warm-white fluorescent tubes) for 10 minutes.

Scoring Procedure. For each subject on each color, the temperature at the moment when the subject indicated the onset of discomfort was recorded from both the wet- and the dry-bulb thermometers. These readings were combined to give the temperature-humidity index (once called the "Discomfort Index") used by the United States Weather Bureau to

[3] This was kindly supplied by special arrangement with the Washington, D.C., office of the Weston Division of Daystrom, Inc.

evaluate the joint effects of temperature and humidity. This index is calculated as

$$I = .4(D + W) + 15$$

where D is the dry-bulb temperature and W is the wet-bulb temperature.

Table 1. Analysis of Variance on Temperature-Humidity Index for Threshold of Discomfort

Source	*SS*	*df*	*V*	*F*	*p*
Color	17.36	4	4.34	1.01	.50
Order	65.90	4	16.48	3.84	.01
Subjects	2604.34	24	108.51	25.31	<.001
Residual (Interactions compounded)	394.40	92	26.79		
Total	3082.00	124			

At the close of the tests, subjects were asked to rank the five colors according to the amount of heat they transmitted, with Rank 1 assigned to the hottest, and Rank 5 to the coolest.

Subjects. Subjects were 25 paid volunteers, all adults, all high school graduates, all able to drive an automobile, and none color-blind. They were 19 men and 6 women.

Results. The mean temperature-humidity index score reported at the onset of discomfort was calculated both by colors and by order of presentation. For the five colors, these scores were: white, 80.5; yellow, 81.2; amber, 81.6; green, 81.0; blue, 81.3. As will be seen in the analysis of variance (Table 1) the effect of color is almost exactly equal to that expected by chance alone.

Table 2. Mean Rankings of Five Colors According to "Amount of Heat Transmitted"

Color	*Rank*
White	2.64
Yellow	2.54
Amber	2.50
Green	3.64
Blue	3.68

The order of presentation did produce a small significant effect, later runs showing greater heat tolerance than early ones. The mean scores by order were: first presentation, 80.3; second, 80.7; third, 80.8; fourth, 81.7; fifth, 82.3.

The results of the rankings by the subjects at the close of the experi-

ment are shown in Table 2. This effect was tested for significance by the Kendall-Friedman ranks test, and is clearly significant ($W = .186$; $p < .01$).

It will be seen that the green and blue are ranked almost identically, and so are the yellow and amber, while the white is at an intermediate position quite close to the yellow and amber.

It might be supposed that in making these rankings after completion of tests, the subject was correctly recalling the temperature at which he had signaled the onset of discomfort. However, the within-subjects correlation between actual temperature-humidity index score at onset of discomfort and subsequent ranking is only +.09, not significantly different from zero.

Conclusion

It may be concluded that:

1. Subjects did not show any change in the levels of heat they would tolerate as a function of the colors of illumination, and

2. Subjects nevertheless persisted in the conventional belief that green and blue are "cool" colors when asked to rank the colors that they had experienced.

It appears, therefore, that if colored illumination were used to increase the comfort of persons exposed to uncomfortably warm conditions, the threshold of discomfort and hence the frequency of their complaints would probably not be altered by the coloring (unless, of course, the coloring also produced a real change in temperature). On the other hand, it seems likely that a false belief in the efficacy of blue or green filters would be widespread.

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Part Seven: ACCIDENTS AND SAFETY

1. Hazard Exposure Differentiation Necessary for the Identification of the Accident-prone Employee *

Paul L. Crawford

The concept of accident-proneness has been the object of much discussion for approximately 30 years. Kerr (1950) reports that controversies have arisen concerning the extent to which accident-proneness exists or has been a determinant of injuries in industry; Kaywood (1956) states that part of the basis for these controversies is failure to identify the truly accident-prone individual. Harris (1950) and LeShan (1952) state that as a result of the general confusion concerning accident-proneness, no predictive test for accident-proneness has been developed.

Viteles (1932) quotes Marbe in defining the accident-prone individual as having a psychophysiological predisposition toward accidents. Therefore, it is necessary, according to Teel and DuBois (1954), to differentiate between "personal" and "situational" accidents in an effort to isolate other than "personal" factors in the accident data.

Data concerning individuals who are involved in accidents, through no apparent fault of their own, should be carefully scrutinized before being excluded from the study or being assigned "situational" causes.

Webb (1956) discusses accident-proneness as:

> A continuing or consistent tendency of a person to have accidents as a result of his stable response tendencies. The problem of identifying accident-proneness is one of establishing the fact that certain individuals had accidents which exceeded those expected on the basis of chance, other things being equal.

In many cases these "other things" add to the contamination of the data and, thus, hinder the search for the accident-prone individual. Teel and DuBois (1954) suggested several refinements in methodology of psychological research on accidents, three of which were: (*a*) need for more sensitive criterion measure, (*b*) better differentiation between personal

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and situational accidents, and (*c*) determination of exposure to hazard by the individual.

It is the purpose of this study to determine the value of differentiating job group hazard exposure in identification of the accident-prone employee.

Discussion. The author attempted to refine the data in this study by following the preceding suggestions. Both minor and disabling accidents were included in the study, although the accident frequency rate in industry is usually based on accidents which resulted in loss of time by the employee. Only accidents which were caused by unsafe acts of the individual were included in the study, thereby excluding situational accidents.

The effect of varying degrees of hazard exposure is demonstrated in the analysis of 220 personal injury accidents of a group of 737 male electric utility employees during the period of one year. These people were engaged in skilled and semiskilled occupations

Table 1 shows the total observed accident distribution and the theoretical distribution. Determination of theoretical distribution is based on technique demonstrated by Greenwood and Woods; Newbold and Cobb as quoted by Viteles (1932); and Webb (1953).

Table 1. Theoretical and Observed Distribution of 220 Accidents for a Group of 737 Employees

No. of Accidents	Theoretical Distribution	Observed Distribution
0	545	549
1	164	157
2	25	30
3	3	1

$\chi^2 = 2.66$, $df = 3$.

Comparison of the theoretical and the observed distributions, which include all employees in the sample studied, reveals no significant difference, $\chi^2 = 2.66$, $df = 3$.

In order to differentiate according to relative hazard exposure, the data are also analyzed by job groups. It is assumed that individuals engaged in the same job task are exposed essentially to the same physical conditions; consequently, variation in individual accident experience should reflect individual difference in susceptibility to accidents.

Accident frequency rates for different job groups are shown in Table 2. The accident frequency rates range from .12 to .65 accidents per employee, $M = .30$, $SD = .15$.

The accident frequency rate of one group, Lineman 3/C, is significantly higher than the average, which indicates that this group had greater than chance accident experience. Analysis of the accident data for this group reveals several factors which probably influence their unusually high acci-

dent rate. Men engaged in this occupation are learning a new and unusually hazardous job, they are in their early twenties, and are relatively inexperienced. According to Schulzinger (1954), in his analysis of 35,000 accidents, these factors are some of the most important circumstances under which an accident is most likely to occur.

Table 2. Accident Frequency Rates for Job Groups Matched in Terms of Hazard Exposure

Job Groups	No. of Employees	No. of Accidents	Accident Frequency Rate
Lineman 1/C	160	72	.45
Lineman 2/C	112	35	.31
Lineman 3/C	34	22	.65 *
Groundman	189	47	.25
Maintenance 1/C	43	9	.21
Maintenance 2/C	34	4	.12
Maintenance 3/C	28	5	.18
Meterman 1/C	36	7	.19
Meterman 2/C	79	11	.14
Meterman 3/C	22	8	.36
Total	737	220	.30

* Significant at .01 level of confidence.

It was determined by the writer that individuals in this group are emotionally stable and enjoy better than average physical health; therefore, any approach to accident prevention in this group, such as a safety training program, must include all of the employees in this particular job.

Theoretical and observed accident distributions of each job group were compared by chi square technique. The results are depicted in Table 3.

Table 3. Chi Square Values for Comparisons of Theoretical and Observed Accident Distributions of Hazard Matched Job Groups

Job Groups	*df*	Value of χ^2
Lineman 1/C	2	.54
Lineman 2/C	2	1.45
Lineman 3/C	3	3.91
Groundman	2	5.04
Maintenance 1/C	2	.00
Maintenance 2/C	2	1.33
Maintenance 3/C	1	.00
Meterman 1/C	2	.00
Meterman 2/C	2	.00
Meterman 3/C	2	.27
Total Group	3	2.66

No group had a greater than chance number of accidents; therefore, no accident-prone individuals were identified by comparing theoretical with observed accident distributions by using the traditional statistical techniques. It should be noted that χ^2 for Lineman 3/C was not significant even though this group has a significantly higher accident rate (Table 2) than the other groups in the study. However, close scrutiny of the accident records of the individuals who have sustained multiple accidents reveals data which suggest the presence of accident-proneness. For example, six individuals' accident rates for a period of seven years were significantly higher than chance; therefore, by definition, they are "accident-prone."

Analysis of psychological variables associated with or contributing to the condition known as accident-proneness was impracticable, in this study, because an insufficient number of accident-prone individuals was identified.

It is important to note that some of the employees who experienced multiple accidents are accident-prone. More importantly, however, comparison of observed accident distribution with theoretical distribution for the total group fails to yield results from which valid inferences concerning existence of accident-proneness may be drawn.

Hazard exposure differentiation, by job groups, must be made in an effort to refine accident data so that variations in accident experience will reflect variation in individual behavior, rather than differences in exposure to hazardous conditions.

Summary

Various problems concerning identification of accident-prone individuals have been discussed. It was pointed out that care should be exercised when interpreting results of accident distribution analysis. Significant differences between theoretical and observed accident distribution of hazard exposure matched groups may exist without being determined if analysis of just the total group distribution is made. Results of this study indicate that groups should be matched on the basis of hazard exposure before an attempt is made to analyze data for presence of accident-proneness.

No accident-prone individuals were identified by the traditional statistical analysis of the accident experience of 737 employees during the one year; consequently, analysis of psychological variables associated with accident-proneness was impracticable in this study.

It is suggested that the accident-prone individual may be identified in terms of chance expectations as compared with others who are exposed to essentially the same occupational hazards, and then an attempt to identify the psychophysiological attributes associated with accident-proneness should be made.

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2. Personality Dynamics and Accident-Proneness in an Industrial Setting *

Anthony Davids
James T. Mahoney

Freud's contributions have made psychologists well aware of the fact that unconscious motivations play a most important role in determining events of everyday life. It is common knowledge, in the fields of psychology and psychiatry, that "accidents" are frequently not chance happenings but are linked in some way with dynamic factors within the person. Personality traits, emotions, attitudes, and other motivational variables, are believed to underlie the fact that some individuals seem to be unusually susceptible to misfortune, failure, and personal injury. Although at present there is rather wide-spread acceptance of these notions regarding psychopathology, there has been little attempt to submit them to empirical verification in well-controlled experiments.

The use of projective techniques should be of considerable help in

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studying these matters. That is, since projective tests are designed to provide valid information about personality dynamics, they should be most useful in investigations of relations between these inner personal factors and susceptibility to physical injury. Therefore, in the present study we propose to use a projective test to study the influence of personality dispositions and attitudes on accident-proneness in an industrial setting.

Method

Subjects. There were two groups of *Ss*, each consisting of 17 males who were employees in an industrial plant. The *Ss* in the two groups were carefully matched on the variables of age, education, intelligence, socioeconomic background, and exposure to high accident hazards. For one group (high accident), the mean age was 35.7 years, the mean education was 11.3 grades, and the mean score on the Wonderlic Personnel Test (Form A) was 24.5; for the other group (nonaccident), the comparable means were 35.2, 11.1, and 24.9. None of these differences is significant. The critical variable that differentiated between the groups was the incidence of accident experience. During a two-year period, from January 1, 1954, to December 31, 1955, the high accident group had a total of 47 accidents reported to the Industrial Accident Board of the Commonwealth of Massachusetts. The nonaccident group had no accidents reported during this same period. In other words, although the *Ss* in the two groups were matched on the types of jobs they were performing and all worked in the same physical setting,[1] the *Ss* in one group were characterized by high accident-proneness, while the other group of *Ss* showed no susceptibility to industrial accidents.

Sentence Completion Technique. *Description.* The 100-item sentence completion test used in this experiment is a slightly modified version of an instrument constructed by Davids and described in connection with several previous studies (**3, 4, 5**). The test was designed originally (**1**) to secure data that would be pertinent to the problem of understanding the relative status of eight personality dispositions in any *S*. These eight dispositions are: (*a*) optimism, (*b*) trust, (*c*) sociocentricity, (*d*) egocentricity, (*e*) distrust, (*f*) pessimism, (*g*) anxiety, and (*h*) resentment. Of the 100 stems, 80 (10 for each disposition) are designed to relate to these dispositions. In the original version of the test, the remaining 20 stems were designed to be neutral. In the modification used in the present study, however, for six of the neutral stems we substituted stems designed

[1] The setting was that of an industrial field fabrication plant concerned with the building of pressure vessels for oil and chemical industries. The types of jobs held by *Ss* in both groups included such classifications as helpers, assembly workers, welders, and fitters.

to indicate attitudes toward employment. Thus, in this form there were 10 stems designed to tap off associations indicative of each of the 8 dispositions, 6 stems designed to reveal work attitudes, and 14 neutral stems. These items designed to reveal work attitudes, numbered according to their location in the test, were as follows:

3. I think that bosses are ——
10. My feeling about work is——
25. On the job ——
56. His work has been ——
67. Ken finds his boss to be ——
99. When I begin a new job I ——

Administration. The Ss were tested in small groups, with Ss from both the high accident and nonaccident groups being intermingled in the same testing sessions. The Ss had no idea of the purpose of the study and the basis for their selection was not revealed to them. Each S received a mimeographed copy of the test and instructions, then proceeded at his own rate of speed. The following instructions were received by all Ss:

"Here are a series of incomplete sentences which you should complete as rapidly as possible with the first thing that comes to mind. Usually you will find that a brief phrase will complete the sentence and sometimes you will find that a single word will do. You have only 20 minutes to finish this test and will have to work as rapidly as possible (writing down the very first thing you think of) in order to complete the task within this time limit."

Scoring. Ten categories were utilized in scoring the sentence completions (eight dispositions, negative employment attitude, and a miscellaneous category), and every response was tallied under only one of these categories, making a total of 100 responses per S. First, a separate score was computed for each of the 10 categories. Then, for each S, the sum of his scores on the three positive or socially desirable dispositions (optimism, trust, sociocentricity) was computed, and the sum of scores on the five negative dispositions (egocentricity, pessimism, distrust, anxiety, resentment) was computed. This cluster of socially undesirable traits has been described elsewhere (2, 4) as forming a personality syndrome called "alienation." For purposes of the present study, another sum was computed based on the S's scores on the three negative traits of egocentricity, anxiety, and resentment. Thus, excluding the miscellaneous category, the Ss in the two groups could be compared on a total of 12 personality measures derived from their responses to this test.

All scoring was done "blind," with the raters being unaware of the identity of the S and not knowing in which group he belonged. The mean percentage of agreement between two independent raters' scoring of the responses was 90%.

Predictions. It was predicted that the Ss in the high accident group, in comparison with the nonaccident Ss, would score lower on the positive personality dispositions, higher on the negative personality dispositions, and higher on negative attitudes toward employment.

Results and Discussion

The results presented in Table 1 clearly confirm our prediction that high accident Ss would be characterized by relatively low scores on

Table 1. Biserial Correlations between High Accident vs. Nonaccident Groups and Scores on Personality Variables, and Comparisons of Means for the Two Groups

Variable	High Accident Mean ($N = 17$)	Non-accident Mean ($N = 17$)	r_b	t
Optimism	10.35	12.12	−.34 *	1.42
Trust	7.59	9.41	−.51 **	2.49 **
Sociocentricity	11.35	17.00	−.76 ***	4.25 ***
Affiliative syndrome (sum of 3 positive variables)	29.29	38.53	−.73 ***	3.79 ***
Pessimism	4.71	5.53	−.19	.85
Distrust	6.76	6.71	+.02	.06
Anxiety	10.76	10.18	+.09	.45
Egocentricity	6.94	5.94	+.19	.82
Resentment	7.94	6.53	+.29	1.22
Alienation syndrome (sum of 5 negative variables)	37.12	34.88	+.13	.59
Modified alienation syndrome (sum of egocent., anx., and resentment)	25.65	22.65	+.36 *	1.16
Negative employment attitude	3.06	1.24	+.70 ***	3.50 ***

* Significant at .05 level for a 1-tailed test.

** Significant at .01 level for a 1-tailed test.

*** Significant at .001 level for a 1-tailed test.

Note. All statistically significant results shown in this table are equally significant when the differences between the groups are tested by means of the nonparametric Mann-Whitney "U" test (6).

positive or socially desirable personality dispositions. The single trait that differentiates most markedly between the two types of Ss is sociocentricity. The highly significant results obtained with the affiliation syndrome show that those Ss who had *not* experienced accidents on the job were, according to their projective responses, more optimistic, trustful, and sociocentric. It should be pointed out that correlations of the magnitude of —.73, which was obtained using the affiliation syndrome, are quite

rare in studies attempting to relate personality measures derived from projective protocols to measures of overt behavior in everyday life situations.

Although in general the high accident Ss tended to obtain slightly higher scores on the negative personality dispositions, statistical tests do not support our prediction of significant differences between the groups. On four of the five dispositions, however, the differences are in the predicted direction. And on the triadic cluster composed of egocentricity, anxiety, and resentment, there is a significant correlation between high scores and high accident-proneness. Thus there does seem to be a trend, but there is no doubt that the negative dispositions do not differentiate between the groups nearly as effectively as do the positive dispositions. This finding may well be attributable to the fact that the Ss used in this study were "normal." That is, they were not hospitalized psychiatric patients, not neurotics being seen in a clinic setting, but were working men who were seen in an industrial setting. It is, therefore, understandable that there were not more pronounced differences between these groups on traits that we would expect to discriminate very clearly between neurotic patients and normal Ss.

The highly significant coefficient (+.70) obtained with the variable of negative employment attitude, indicates that such an attitude is highly associated with industrial accident-proneness. Even though the sentence completion test contained relatively few stems designed to tap associations indicative of employment attitudes, the results show that the high accident Ss tend to have a negative, socially undesirable attitude toward their job, work in general, and their supervisors or bosses.

The over-all results of this study are quite encouraging and suggest the feasibility of putting projective techniques to use on problems such as the one reported here. Much further research remains to be done in the area of accident-proneness, and there are numerous other industrial problems that could be studied fruitfully by means of projective tests. In addition to sentence completion techniques, it would seem that instruments like the Rorschach and the TAT could be used to good advantage in attempting to gain further understanding of relations between personality attributes and on-the-job performance of personnel at all levels of the industrial hierarchy.

Summary

Two groups of Ss, one composed of men who were high on accident-proneness and the other composed of men who suffered no accidents in the same industrial setting, were studied by means of a sentence completion test. Responses to this projective technique indicated that the high accident Ss, in comparison with the nonaccident Ss, were significantly

lower on the socially desirable personality dispositions of optimism, trust, and sociocentricity. In general, there were no statistically significant differences between the two groups on several negative personality dispositions, but there was a slight indication of positive association between high accident-proneness and high scores on a cluster composed of the socially undesirable personality dispositions of egocentricity, anxiety, and resentment. There was highly significant association between high accident-proneness and projective responses indicative of a negative attitude toward employment.

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3. A Study of Accidents in 147 Factories *

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Design and procedure

Accumulated research in safety psychology reveals a predisposition to follow either of two bents in experimental design. The first—and most common—has been to study either one variable or one idea for its rela-

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tionship to accidents. This bent has resulted in many useful investigations of such topics as temperature effects, excessive hours, age, ability, experience, etc. The other bent has been toward fact-finding studies of a multivariable nature which are not aimed at "proving" any particular point of view and are not preoccupied with any one variable or narrow "causal" idea.

This latter multivariable or global approach ultimately should furnish the empirical foundation for broader psychological understanding of and mathematical accounting for factory accident rates. The RCA Victor study (1) with 44 variables in 53 factory departments, first of this type, revealed the possibilities of the *gestalt* approach. The present study seeks to extend the approach by simultaneous study of 75 variables in 147 separate factories. It is believed that the testing of variables in such potentially diverse situations should result in conservative correlation coefficients which will help round out the constellation of potential predictive vectors for accounting for—and ultimately controlling—industrial accidents.

An attempt in this study is made to explore further in three principal areas of factory and community climate that might be related to accidents: (1) beauty and pleasantness of physical surroundings; (2) psychosocial aspects of community environment; (3) labor-management relations and personnel policy. An hypothesis is stated or is implicit in each variable correlated with each safety criterion; further, the authors hypothesize the emergence of a "climatic" pattern characteristic of low-accident factories.

A questionnaire was developed by the authors in close collaboration with the members of the Executive Committee of the Automotive and Machine Shop Section, National Safety Council. With a cover letter and return envelope, the lengthy (nine pages) questionnaire, entitled "Operation Brainprod," was mailed to 743 safety directors in the Automotive and Machine Shop Section of the National Safety Council. Of the 743 sent out, 147 usable returns were received, all American except one Canadian and one Swedish.

Safety directors of the 147 cooperating plants supplied safety and other data representing 254,602 workers, a substantial segment of total personnel in the automotive and machine shop industry. The median plant has approximately 600 workers. Basic criteria, accident frequency and accident severity, are objective data computed in each of the plants according to the standard formulas of the National Safety Council.

Results

As indicated in Table 1, estimates on 75 aspects of psychological climate were correlated with plant accident frequency and severity records. Because of the probably modest (but, unfortunately, unknown) reliability of most of these variables, they theoretically could be corrected for at-

tenuation and this would increase many more coefficients to the level of significance. To favor more conservative interpretation, however, no corrections have been made.

Since the table of 75 variables and their correlations is largely self-

TABLE 1. CORRELATION BETWEEN CERTAIN ASPECTS OF PSYCHOLOGICAL CLIMATE AND ACCIDENT FREQUENCY AND SEVERITY RATES IN AUTOMOTIVE AND MACHINE SHOP PLANTS ($N = 147$) *

(ALL COEFFICIENTS PEARSONIAN UNLESS INDICATED r_t)

	Frequency	Severity
1. Per cent of work time ordinarily spent on rush orders	.08	—.02
2. Per cent employees seasonally laid off per year (average of last five years)	.19	.05
3. Per cent labor turnover for 1951	.16	.07
4. Absenteeism rate for 1951	.02	.55
5. Per cent personnel fired for disciplinary reasons (1951)	.14	.01
6. Per cent personnel involved in union grievance procedures	—.09	.00
7. Per cent of rest rooms that "are defensible models for other plants to imitate."	—.13	—.08
8. High producers typically "respected as good workers" in their departments (rather than "envied," "not accorded any deferential treatment," "regarded as grinds," or "regarded as company stooges") (r_t)	—.50	.00
9. Writing and defacements on rest room walls and stalls	—.09	—.07
10. Efficient use of paper towels and sanitary supplies	.04	—.09
11. Management communications precede important changes or events (as opposed to rumors) (r_t)	.09	.15
12. Employees typically continue work when a foreman temporarily leaves (versus "horseplay," etc.)	.06	—.33
13. Plant maintains a suggestion system	.04	—.07
14. Per cent personnel submitting suggestions annually	—.01	.08
15. Per cent of management conventionally using same rest rooms as ordinary shop employees	—.07	—.16
16. Per cent of management who habitually share eating facilities used by typical employees	.12	—.19
17. Per cent employees' families participating in company social activities	.11	.00
18. Self-representation to management used (r_t)	—.10	—.24
19. Elected representation (non-union) used (r_t)	.12	—.08
20. Independent union representation (r_t)	—.01	—.06
21. National union representation (r_t)	.06	.33
22. Per cent union membership	.11	.16
23. "Check-off" (deduction by company from pay check) collection of union dues (r_t)	—.12	.04
24. Number of unions represented in plant	.00	.05
25. Number of company publications issued to employees (handbook, newspaper, safety book, magazine, calendar)	.00	—.08

TABLE 1—*Continued*

	Frequency	Severity
26. Company sends greeting cards to honor employee marriage, promotion, anniversary, etc. (r_t)	.28	—.23
27. Severity of penalty applied to tardiness	.07	—.26
28. Severity of penalty applied to absenteeism	.08	—.10
29. Per cent of personnel given two weeks or more of paid vacation annually	—.02	.13
30. Per cent of personnel with opportunity of choice for date of vacation period	.23	.17
31. Per cent of personnel with the right of appeal of grievances over head of immediate supervisor through the line organization	.02	.11
32. Company contracts and orders held confidential	.00	.12
33. Per cent of employees who are male	—.12	—.04
34. Per cent of managerial personnel formerly employed in company shops	—.07	—.18
35. Age of shop foremen	.01	—.01
36. Frequency of following in the total employment examination (aptitude tests, hearing tests, vision tests, blood pressure, heart condition, allergy status, ulcer history, arthritis history)	—.14	—.01
37. Per cent employees purchasing or owning company stock (r_t)	—.10	—.16
38. Per cent employees participating in profit sharing (r_t)	—.03	—.37
39. Per cent employees working under individual incentive plans (r_t)	—.03	.04
40. Per cent employees working under group incentive plan (r_t)	.23	.08
41. Per cent employees working under combined group-individual incentive plan (r_t)	—.26	.24
42. Formal job evaluation with rates adjustment within last five years (r_t)	—.05	—.12
43. Per cent employees exposed to extreme temperatures	.06	.55
44. Number of personnel (r_t)	—.37	—.14
45. Total acreage of plant and grounds	—.08	.00
46. Acres of lawn around the plant	—.08	—.11
47. Number of trees around the plant	—.05	—.11
Per cent of personnel with easy access between home and plant to—(all r_t)		
48. a. Taverns, cocktail lounges, etc.	.09	.10
49. b. Gambling places, bookie joints, etc.	.12	.02
50. c. Houses of prostitution	.26	—.10
Present in the vicinity of the plant (all r_t)		
51. a. Taverns	.08	.04
52. b. Gambling places	.12	—.17
53. c. Houses of prostitution	.08	.00
54. d. Private residences	.20	.23
55. e. Churches	—.05	.00
56. f. Other industrial plants	.28	.22

TABLE 1—*Continued*

	Frequency	Severity
57. Per cent employees who routinely handle heavy materials (over 50 pounds)	.23	.30
58. Per cent employees working unskilled jobs	—.08	.02
59. Per cent employees needing shower after work	.13	.44
Per cent employees required to use following:		
60. a. Goggles (r_t)	—.06	.00
61. b. Safety shoes (r_t)	.00	.20
62. c. Protective helmets (r_t)	—.10	—.04
63. d. Rubber or leather aprons (r_t)	—.19	—.10
64. More of a job-type (non-repetitive work) shop than a highly mechanized repetitive shop	—.02	—.13
65. Average employee travel time to work	—.10	—.10
Per cent employees using various means to get to work:		
66. a. Public street car or bus	.08	.16
67. b. Private auto	—.01	—.13
68. Per cent employees living in blighted areas	.27	.16
69. Per cent of total plant community containing substandard living conditions	.16	—.01
70. Per cent employees owning or buying homes	—.13	—.18
71. Per cent employees who are heads of families	—.15	.04
72. Per cent employees who are under 30 years of age	.03	.03
73. Per cent employees who had their wages garnisheed within the past year	.19	.09
74. Accident frequency rate	.xx	.34
75. Accident severity rate	.34	.xx

* Coefficients which are statistically significant at the 95 probability level or higher are indicated in boldface. Some relatively substantial *r*'s which are not significant are tetrachoric and did not meet the criterion of significance according to the Guilford-Lyons tetrachoric tables.

explanatory, comment here will be reserved almost entirely to variables which were found to be related significantly to accidents.

Accidents Frequency. Variables found to be unambiguously related to accident frequency rate follow.

Seasonal Layoffs. Plants with heavy tendency to seasonal layoffs had more accidents. This could be due to the emotional insecurity engendered and/or to less success in retaining experienced personnel.

High Producers. Low accident rate plants report typically that the "high producer" workers are "respected as good workers" in their departments rather than "envied," "not accorded deferential treatment," "regarded as grinds," or "regarded as company stooges."

Big Plants. The larger plants have lower accident frequency rates, but this may be artifactual of uncontrolled factors such as greater areas of routine and "safe" repetitive work, automation, etc.

Prostitution. "Easy access" between homes and plant to houses of prostitution is related to higher accident frequency.

Other Plants about. Plants in an area of many other industrial plants have higher accident frequency rates. This may be the result of greater aesthetic ugliness of environment causing less positive worker emotional investment in job and plant, greater transportation congestion, etc.

Heavy Materials. Plants with more personnel handling heavy (over 50 pounds) materials have higher accident frequency rates. Fatigue and physical stress still appear to be important causes of accidents.

Blighted Living Conditions. If many personnel are compelled to live in blighted neighborhoods, the plant accident rate tends to be high. Blighted conditions usually mean overcrowding, environmental ugliness and uncleanliness, and greater moral and physical hazards of many kinds to the employee and his family, resulting in more mental depression and preoccupation on the job.

Garnisheed Wages. A substantial percentage of personnel with their wages garnisheed by legal action during a year tends to indicate a plant with an above-average accident rate. Here perhaps is evidence of outside stresses "spilling over" into individual character formation, and worry and preoccupation on the job.

Accident Severity. Variables found to be unambiguously related to accident severity rate follow.

Absenteeism. High frequency plants do *not* have high absenteeism, but high *severity* plants do. The explanation seems to be that higher absenteeism results from more severe accidents, since the measure of severity is days lost from work. Accident severity, as measured, *is* absenteeism.

"Equalitarian" Eating. The average accident severity rate was lower in plants with a high per cent of management habitually using the same eating facilities that serve typical employees. This may result in less social frustration because of shorter "social distance" between employees and management and/or such managerial eating practices may result in improvement of eating facilities with consequent better morale. The hypothesis here is, of course, that high morale employees do not "dope off so completely to be hurt so badly" as do low morale employees.

National Union Representation. Plants most thoroughly organized by a national union tend to be above average in accident severity. This result is believed to be an artifact of the higher average age of workers in organized plants, older workers not "mending" as fast as do younger workers after an accident.

Penalty for Tardiness. Plants which are most severe in penalizing tardiness have a significantly lower average accident severity rate. This result is directly contrary to the authors' original expectation, and no explanation is offered.

Employee Profit-sharing. Plans by which the company shares some

profits with employees appear to be associated with below-average accident severity rates.

Extreme Temperatures. Work in an extreme temperature environment is associated rather strongly with higher average severity in accidents. Other evidence in this study suggests that older workers are unduly liable to severe injury in extreme temperature environment.

Dirt and Perspiration. Plants with a high proportion of personnel needing showers after work tend also to have above-average accident severity rates. This relation is assumed to reflect the impact of fatigue and other physical frustrations.

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4. Complementary Theories of Safety Psychology *

Willard Kerr

A. Background. Probably the most universally ignored area of safety psychology is that pertaining to the psychological climate of the workplace. A devotion to safety gadgets on the one hand and concern for the alleged proneness factors within the accident repeater on the other hand has led to the almost total neglect of the situational factors which help shape work personality and help manufacture accident-free or accident-liable employees.

Many investigators (21) have shown that becoming a safe worker is a typical learning function. The decline in accidents from date of employment in the typical job is a representative learning curve. But like other learning curves, the decline in error performance can be obstructed by a multitude of other factors. It now appears that a chief obstruction to the rapid decline in error performance is defective psychological climate. This conclusion, to be supported in this paper, stands in sharp contrast to past emphasis upon the accident proneness theory.

B. The Accident Proneness Theory. Before presenting the crucial evidence on this theory, the term "accident proneness" should be defined. *Accident proneness* is a constitutional (i.e., permanent) tendency within

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the organism to engage in unsafe behavior within some stated field of vocational activity. A temporary tendency to have accidents is not proneness; it is liability. And proneness is not general; that is, its referent to an activity field must be limited to be meaningful, for, obviously, *everyone* is "accident prone" in a general sense because there are potential tasks that no human being can perform without accident (e.g., climb the outside walls of the Empire State Building to the top with one's bare hands).

Professors Mintz and Blum (17) and Maritz (15) have shown that the accident-proneness theory has been explaining entirely too much of the industrial accident rate. The research of Cobb (1), Johnson (10), Whitlock and Crannell (24), Forbes (3), Farmer and Chambers (2), and Harris (7) point toward the same conclusion. Mintz and Blum showed that the frequency of "repeater" accidents approximates a pure chance (Poisson) distribution. Maritz then suggested that the final crucial test of variance in the industrial accident rate accounted for by proneness is the correlation between one's accidents experienced over two different periods of accident exposure—such as the last two years and the next two years. Ghiselli and Brown (5) have collated 18 such coefficients from the literature, and the present author has computed their median; it is .38. This typical value suggests that only about 15 per cent of the variance in individual accidents is accounted for by variance in individual accident proneness; furthermore, this even may be spuriously high because such coefficients are contaminated by the correlation of the worker's position hazard with the consistency of his accidents over split time periods. In fact, it is almost certain that much, if not most, of this 15 per cent of potential variance due to accident proneness actually is due to environmental factors (temperature differences, fumes, congestion-space-threat differences, etc.) left uncontrolled and hence correlated with each other in the 18 coefficients cited.

Even allowing the unreasonable assumption that these 18 coefficients were not influenced by fatigue and stress differences in different job locations, the 15 per cent of variance in accidents "accounted for" by proneness still leaves 85 per cent of the variance in accident rates unaccounted for.

It is interesting that an earlier study of automobile drivers by Forbes (3) arrived independently at the similar conclusion that the accident repeater contributes not more than three or four per cent to the accident problem. Both Johnson (10) and Thorndike (20) who later surveyed the entire research literature on automobile safety likewise found that such constitutional factors as basic aptitudes yielded negligible relationships with accident records. Relevant, also, is the fact that Hunt, Wittson, and Burton (9) computed the psychiatric discharge rate at Naval induction stations and subsequently during World War II to vary between four and nine per cent (such dischargees were, of course, those individuals re-

garded as "prone" to behavior unsafe to themselves and/or their country).

Two situational or climatic theories may explain the remaining non-chance variance.

C. The Goals-Freedom-Alertness Theory. Plainly, both management and union training activities, policies, and leaderships are responsible for some interference with the normal decline of error performance.

In stating this theory now, we hold that *great freedom to set reasonably attainable goals is accompanied typically by high quality work performance.* This theory regards an accident merely as a low-quality work behavior—a "scrappage" that happens to a person instead of to a thing. Raising the level of quality involves raising the level of alertness; such high alertness cannot be sustained except within a rewarding psychological climate. The more rich, therefore, the climate in diverse (economic and non-economic) reward opportunities, the higher the level of alertness—and the higher the level of work quality. Obviously, the rewards system must be geared to support high quality work behavior.

In business practice some training interferes by too much "telling what to do and what not to do" and too little encouragement to the new worker to do his own thinking and "stand on his own feet." Union leadership likewise often is guilty of too much propagandizing and not enough "asking" in relations with new workers. Such initial climate for the new worker is less conducive to alertness than to a relatively unmotivated, resigned, passive conformity to the apparently already-structured total situation.

Accidents, of course, show that the total situation is *not* firmly structured and from them the worker gradually accepts more self responsibility in order to survive. But an accident is an expensive teaching device. Furthermore, if it occurs in a climate in which the employee is expected to supply his energy but not his opinions or ideas, the accident is misunderstood as a foreign intruder which does not belong in the scheme of events. In such circumstances, it rarely occurs to management, union, or worker that an accident is made necessary and inevitable in order to teach the employee his own individuality and essential personal dignity.

Even the teaching efficiency of the accident itself is interfered with, however, if most aspects of the total psychological climate in effect deny that the individual's own mental content is important.

If the climate encourages the individual to set up long-term and short-term goals with reasonable probability of attainment, the *Gestalt* of the work situation seems less fixed and the worker feels himself to be a significant participant. Significant participation makes for habits of alertness, problem-raising, and problem-solving. The psychological work environment must reward the worker emotionally for being alert, for seeking to contribute constructive suggestions, for passing a tip to a co-worker on how best to do something or how not to get hurt, and for achievement

out of the ordinary. The worker must feel free to exercise influence over his environment.

Considerable evidence supports this theory. Factory departments with more movement of personnel among departments, that is, intra-company transfer mobility, have fewer accidents (12); the same is true of departments with greater promotion probability for the typical employee (r is —.40) (12). Departments with the best suggestion records (rewarded) tend to have fewer accidents (12). Additional evidence of the influence of the stimulating individual climate on safety is found in the tendency toward fewer accidents in individual-type than in crew-type jobs at the International Harvester Works (11). In individual-type work, the employee rarely is uncertain about his responsibility for consequences; he better knows his immediate work goals. Another interesting bit of evidence is that in two different studies (11, 12) the factory departments with incentive pay systems, although problem departments in regard to monotony, lower job prestige, and lower promotion probability, still have no more accidents than departments without incentive pay systems. This seems in such defiance of expectations as to suggest that incentive pay systems restrict accidents by encouraging greater individual initiative and alertness.

Accidents are more frequent in jobs of lower-rated prestige (11, 12); one interpretation of this finding is that climatically the job must seem worthy enough to the worker to sustain his euphoria level. This interpretation is supported by the finding of Hersey (8) that out of 400 accidents which were studied clinically, more than half took place when the worker was in a worried, apprehensive, or some other low emotional state.

This individual goals-freedom-alertness theory suggests the climatic need for providing emotional reward opportunities for alertness—such as special economic incentives, prestige-building honors, extra privileges, machine and work space decoration contest participation, and representation on special committees and councils. These rewards held as attainable goals by workers in relatively "dead end" jobs should operate to raise the average level of alertness, not just to hazards but to everything.

D. The Adjustment Stress Theory. The individual goals-opportunity-alertness theory of safety seems to cover much of the variance not covered by the proneness theory, but some variance still remains and it appears necessary to verbalize a third theory. Probably almost all of the remaining variance can be explained by a third theory—*an adjustment stress theory. It holds that unusual, negative, distracting stress upon the organism increases its liability to accident or to other low quality behavior.* This too is a climatic theory, because environment is internal as well as external, and this theory refers to distractive negative stresses imposed upon the individual organism either by internal environment (such as disease organisms, alcohol, or toxic items) or by external environment

(such as temperature excesses, poor illumination, excessive noise level, excessive physical work strain). Its stresses are different from those experienced by the accident prone; their stresses result from a *constitutional* inadequacy. Ordinary adjustment stress is *not* the result of constitutional inadequacy but of temporary conditions.

What often appears at first to be constitutional accident proneness may be shown very clearly upon more careful examination to be the operation of *temporary* stress factors. The most sobering example of this is found in the curve of accident rates of successive age groups of industrial workers (13). This curve shows high rates in the first 10 years of the worklife and a secondary increase in rates between the ages of 40 and 55. These age periods also are the great stress periods in the typical worklife; this is suggested by the fact that the accident rate curve and the turnover rate curve (14) superimpose almost perfectly upon each other when plotted through successive age groups of the industrial population. The alleged proneness within the young accident repeater is largely dissipated when one considers that most of the stress is environmental—and associated with adjustment to work discipline, attaining self-sufficiency away from parental ties, courtship, marriage, assumption of family economic responsibilities, and the struggle for a foothold on a vocational ladder that seems to lead somewhere worthwhile. Another set of obvious stress explanations comes to mind to account for the "middle-age boom" in accident rate.

Temporary stress factors which already have been found significantly correlated with accident rates include employee age (13), workplace temperature (6), illumination (23), mean rated comfort of the shop (r is —.70) (11), degree of operational congestion (11), obvious danger factor threateningly present (11), manual effort involved in job (r is .47) (11), weight of parts handled (11), frequency of parts handled (11), alcohol consumption (22), and influence of disease organisms (18).

E. Complementary Limitations and Interpretations. It seems wise to emphasize that both of these new theories of safety complement each other as well as existing proneness theory. In the goals-freedom-alertness theory it must be recognized that (*a*) even under an optimal opportunity climate, individuals who lack the characteristics necessary for the work probably will continue to have accidents; (*b*) excessive physical stresses can cause accidents in any psychological climate; and (*c*) psychological stresses relative to adjustment to changing life aspirations, family and marital affairs, etc., still will carry over into the workplace psychological climate and cause accidents.

In the adjustment stress theory it must be admitted that individual differences do exist in ability to withstand what ordinarily would be stress-inducing situations. Yet, such individual differences account for less than one-fifth of the variance in individual accident rates; therefore,

the limitations on the accident proneness theory appear to be much more severe than those on the adjustment stress theory. The fact is that both employer judgment and job applicant judgment operate to prevent the operation of any great amount of accident proneness. While all of us are accident prone for one task or another, we don't ordinarily apply for or allow ourselves to be engaged in such tasks—and we probably couldn't get hired for such tasks if we tried.

On the basis of the evidence summarized and the author's own estimates, the variance in accident rates among industrial personnel probably distributes in terms of theoretical causation according to the following pattern:

Accident proneness	1% to 15%
Individual goals-opportunity-alertness	30% to 40%
Adjustment stress	45% to 60%
Total Variance	100%

Constructive thinking about the individual goals opportunity climate and about adjustment stresses should assist industry to escape the defeatism of the overly-emphasized proneness theory and better understand and control accidents.

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Part Eight: ENGINEERING PSYCHOLOGY

1. Psychology and the Design of Machines *

Franklin V. Taylor

Psychologists have been helping engineers design machines for more than fifteen years. It all began during World War II with the rapid development of radars, sonars, air-craft control systems, and other similar devices. Previous to this time, the only role played by psychologists relative to military mechanisms was that of doing research and giving advice on the selection and training of the operators. However, very early in the war, it became apparent that these Procrustean attempts to fit the man to the machine were not enough. Regardless of how much he could be stretched by training or pared down through selection, there were still many military equipments which the man just could not be moulded to fit. They required of him too many hands, too many feet, or in the case of some of the more complex devices, too many heads.

Sometimes they called for the operator to see targets which were close to invisible, or to understand speech in the presence of deafening noise, to track simultaneously in three coordinates with the two hands, to solve in analogue form complex differential equations, or to consider large amounts of information and to reach life-and-death decisions in split seconds and with no hope of another try. Of course the man often failed in one or another of these tasks. As a result, bombs and bullets often missed their mark, planes crashed, friendly ships were fired upon and sunk. Whales were depth-charged.

Because of these "human errors," as they were called, psychologists were asked to help the engineers produce machines which required less of the man and which, at the same time, exploited his special abilities. The story of what happened is sufficiently well-known not to require any lengthy retelling here. In brief, the psychologists went to work, and with the help of anatomists, physiologists, and, of course, engineers, they started a new inter-discipline aimed at better machine design and called variously human engineering, bio-mechanics, psychotechnology, or en-

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gineering psychology. The new field has developed rapidly in the seventeen or eighteen years of its existence, and it has now attained sufficient respectability to be accorded divisional status by the American Psychological Association. At the last meeting of the Council of Representatives, authorization was given for the founding of The Society of Engineering Psychologists as Division 21 of the APA.

It seems fitting, now that engineering psychology has been recognized as a viable entity, that we examine this new field to find out just what it is that psychology is doing for the design of machines. It is probably even more necessary that we also inquire into what the participation in the design of machines is doing for, or to, psychology. Many young people are being lured into human engineering by the abundant opportunities provided for advancement and the tantalizing salaries offered by commercial organizations. It has been suggested by an unassailable authority that a major break-through in the field of psychology in recent years has been the psychologists' discovery of money. It may be remarked that it was undoubtedly an engineering psychologist who first got wind of the find.

In all seriousness, however, psychologists who might otherwise conduct basic research may be attracted into this new applied area, and it is therefore important to know what it represents professionally and scientifically in order to evaluate its threat, or its promise. To decide what actions to take relative to encouraging the further development of the field, answers are needed to questions such as the following: To what extent is engineering psychology engineering, to what extent is it psychology, and to what extent is it neither? Is it a fruitful scientific area? Is it, indeed, a scientific area at all?

In the attempt to provide answers to these questions, let us look at psychologists caught in the act, so to speak, of doing human engineering. However, before we can meaningfully analyze the behavior of engineering psychologists, the concept of the man-machine system must be described. Human engineers have for some time now looked upon the man and the machine which he operated as interacting parts of one overall system. In Fig. 1 is shown a paradigm of the concept. This may be viewed as a radar device, a pilot-aircraft control system, a submarine diving control station, the captain's station on the bridge of his ship, or, in fact, any man-machine system at all.

In essence, it represents the human operator as an organic data transmission and processing link inserted between the mechanical or electronic displays and controls of a machine. An input of some type is transformed by the mechanisms into a signal which appears on a display. Perhaps it is shown as a pointer reading, a pattern of lights, or a pip on a cathode ray tube. However it appears, the presented information is read by the operator, processed mentally, and transformed into control responses.

Switches are thrown, buttons are pushed, or force is applied to a joy stick. The control signal, after transformation by the mechanisms, becomes the system output, and in some devices it acts upon the displays as well. These latter are called "closed-loop" systems in contrast to "open-loop" systems wherein the displays do not reflect the human's response.

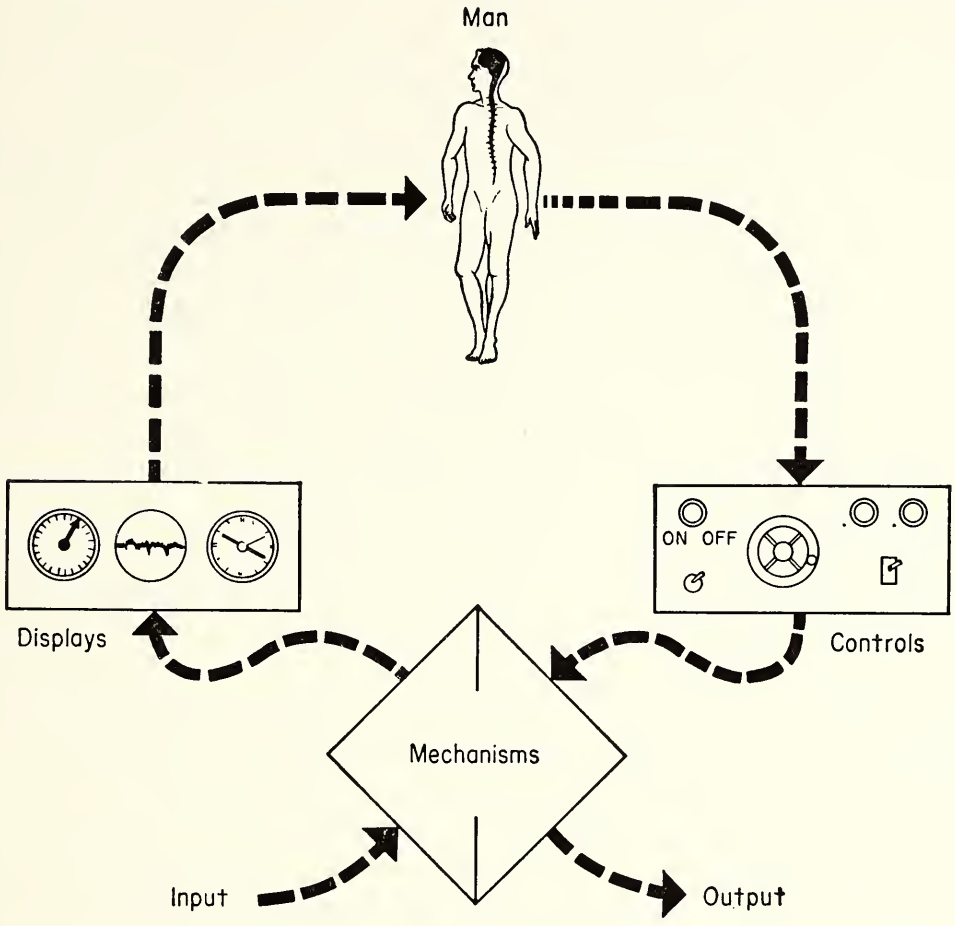

FIG. 1. The man-machine system.

When the man and the machine are considered in this fashion, it immediately becomes obvious that, in order to design properly the mechanical components, the characteristics of the man and his role in the system must be taken into full account. Human engineering seeks to do this and to provide as much assistance to the system designer as possible. Specifically, the psychologist tries to help his engineering colleague in three different ways. First of all, he studies the psychology of the human as a system component. Second, he assists the engineering in experimentally evaluating prototype man-machine systems. Finally, he teams up with engineers to participate actively in the design of machines. Each of these human engineering functions will be described in turn, beginning with the last and the least scientific activity.

Human Engineering Technology. The academic psychologist often for-

gets, or perhaps never knew, that human engineering is not only a science, it is also a technology; it not only tries to find out things about the interaction of men and machines, it builds the latter. And, surprisingly enough, it is not just the engineers who do the building. There are psychologists also, renegades to be sure but psychologists nevertheless, who are taking an active hand in the design of systems. It is true that with some their apostasy is venial, having progressed only to the stage of writing human engineering handbooks; but with others the defection is more serious, it having developed to the stage where they can spend anything up to full time in systems planning and design with only a twinge or two of longing for the serenity of the research laboratory and the comfort of statistics.

The aim of the human engineering technologist is to apply the knowledge of human behavior, which he and others have gained, to the structuring of machines. He seeks to translate scientific findings into electronic circuits and "black boxes" which in specific situations will compensate for the human's limitations or complement his abilities. Specifically, the practicing engineering psychologist works on an engineering team and participates in the design of man-machine systems. Using procedural analysis techniques, drawing upon his psychological knowledge and attitudes, and employing his common sense and creative ability, the human engineer proceeds to contribute to system development at three levels of complexity.

At the simplest, he designs individual displays, controls, or display-control relationships. At a somewhat more complex level, the human engineering technologist contributes to the design of consoles and instrument panels. At the highest level of complexity, he assists in structuring large systems composed of many mechanical elements and frequently several human beings. In this capacity he helps to determine what information must flow through the system, how it must be processed, how many men are required, what tasks they will perform, and what type of information each one will need. In short, the engineering psychologist helps at this level to determine the configuration of the system.

Human engineering technology is much more extensively practiced by psychologists than is generally recognized by those who are not closely identified with the field. The specific nature of each accomplishment and the difficulty of assigning individual credit for team effort conspire with security and proprietary considerations to keep the lay and psychological public in almost complete ignorance of the technological products of human engineering. However, literally hundreds of devices and systems have been affected to a greater or less extent during the last ten years by the efforts of engineering psychologists. Every major type of military equipment has received some attention, as have also certain nonmilitary products such as aircraft instruments and cabins, flight control towers, artificial limbs, semiautomatic post office sorting equipment, telephone

sets, theodolites, experimental equipment for the earth satellite program, control panels for an atomic reactor, and numerous industrial machines.

Although there are no statistics available as to precisely how much time psychologists devote to technology, an informal estimate based on my own experience would suggest that approximately one-third of the engineering psychology effort in government and industry is devoted to the practice of equipment design.

Now, how does this practical activity tie in with psychology? Certainly it cannot be denied that in one sense of the term it is an area of applied psychology. Facts about human behavior are being utilized in the design of machines. Yet in another sense it cannot be regarded as psychology at all, for certainly the design of machines is engineering, regardless of who does it or of the extent of interest on the part of the designer in human behavior. To deny this in favor of the view that systems design is applied psychology because of its human reference, converts all engineers to psychologists the moment they take into account the behavior of the human for whom they are designing the machine. Certainly we do not customarily consider all occupations oriented toward human behavior to be psychology. If we did, the APA would undoubtedly be the largest professional society in the world, speaking for actors, school teachers, policemen, politicians, and members of the clergy, in addition to its present membership. So far as I know, such an expansion is not yet contemplated.

A second difficulty which stands in the way of incorporating the design aspects of human engineering under psychology arises from the nature of the goal of systems design. Whereas the primary aim of the practitioners of the more conventional applied psychologies is to control and influence people, the human engineering designer seeks to produce more effective machines. While psychology has, in the past, been applied to improving human performance by selecting, training, and motivating normal men, by curing mentally ill men, and by persuading both to buy toothpaste and television sets, human engineering aims first at building better systems and only secondarily at improving the lot of the operator. Thus, whereas conventional psychology, both basic and applied, is anthropocentric, human engineering is mechanocentric.

Because of these peculiarities of the new field, one is forced to the conclusion that it is of questionable profit to attempt to maintain that human engineering technology is a branch of psychology. Or if one still wishes to do so, it must be admitted that it is psychology most diluted and highly contaminated with physical science and engineering considerations. Although this, of course, does not reflect in any way upon the importance to society of human engineering, it does raise questions concerning the training and professional affiliation of those psychologists who decide to enter this exciting new trans-disciplinary technology.

Man-Machine Systems Evaluation. The second way in which the engineering psychologist assists in the design of machines is by taking part in systems evaluations. Like human engineering technology, evaluation studies require a sizeable effort yet receive scarcely any publicity. Evaluations have been performed on headphones, range finders, gunsights, fire control and missile control systems, radar sets, information plotting systems, combat information centers, aircraft control towers, and numerous assorted display and control components. In some instances, the experiments have been carried out in the laboratory with the system inputs being simulated. In other cases, the tests are conducted in the field. But in both situations, the attendant complexities and difficulties of statistical control make this necessary variety of research as trying as any in which psychologists are likely to participate.

The reason that psychologists were called upon in the first place to assist in these evaluations was that they possessed methods for dealing with human variability. In contrast, the engineers generally had worked only with time-stationary components and, therefore, found themselves at somewhat of a loss when they were called upon to assess the performance of devices which were being operated by men.

It is easy to see that psychologists have something definite to offer in regard to this aspect of systems design, and it is not surprising, therefore, that their services are often sought out and accepted. However, the question which we wish to pose, albeit a bit bluntly, is what are the psychologists getting out of it in turn, besides a living? Certainly they are making a contribution to the engineering of better systems, and the consciousness of this may be all that is required for the satisfaction of the individual. Yet, one might wish to know if there were any other returns—to science in general or to psychology in particular.

Admittedly, this is a difficult question which will be more easily answered fifty years from now than at present after only a few years of this activity. But one thing can be said right now about experiments performed on man-machine systems: if one's main object is to learn about human behavior, the use of a complex systems experiment is an uncommonly unwieldy way to go about it.

This may be illustrated with a preposterous, hypothetical systems evaluation. Suppose we wished to compare the performance of a boy on a bicycle with that of a boy hopping on a pogo stick. The main independent variable would be the nature of the boy-machine system; the dependent variable could be, for example, the length of time to travel a quarter mile.

Here we would have a perfectly proper systems test. At least it could be made proper through adequate attention to the training of the boys and to statistical precautions to overcome human variability. Also, the experiment would undoubtedly yield clear and unambiguous results.

Assuming that the maintenance of the two conveyances was adequate to the point where neither broke down during the race, the boy-bicycle system would very likely prove to be superior to the boy-pogo stick complex. It is granted that, before positive recommendations could be made concerning the adoption of one vehicle system over the other as a general means of boyish travel, other system criteria such as initial cost, cost of replacing parts, safety, maneuverability, ease of stowage, and consumer acceptance would have to be considered. But this is also true and constitutes no valid criticism of the evaluation. The test itself could have been highly successful; and, if so, we would have learned from it something about systems.

But what have we learned about boys? After all, we are psychologists and are interested in the laws of human behavior. What anthroponomic relationships are revealed by the study? It would seem clear that in our contrived example we have learned next to nothing of interest to psychology. Apart from finding out that boys can learn to operate both bicycles and pogo sticks, the test has disclosed nothing about the characteristics of the human operator. There are several reasons for this.

First of all, the dependent variable in the experiment is a measure of system performance, not human performance. It is perfectly apparent that the fact that one system is better than the other does not mean that the boy in the superior system is doing better in any real sense than the boy who loses the race. Quite the contrary might be true. The boy on the losing pogo stick may actually be doing a better job of pogo-stick jumping than the bicycle rider is doing of his bicycle riding. As long as one is dealing with a system performance variable, the behavior of the human in the system can only be inferred, and often the inference is hazardous indeed.

This would not be a serious matter if it were always possible to find some other dependent variable which did directly reflect human behavior. But in many studies no meaningful, uncontaminated, human performance variable exists. Whenever the human responds through some variety of control, his response is inextricably tied up with the physical properties of the control itself. Thus, in our example, it is not possible to measure hopping independently of the physical characteristics of the pogo stick hopped on, nor pedaling in the absence of pedals. Try as one will, one cannot pedal a pogo stick nor effectively hop through the air on a bike. Since it is impossible to separate the manner in which the human applies force from the characteristics of the thing to which the force is applied, there is no way of getting a pure measure of man's behavior in many systems studies and, as a matter of fact, in many laboratory experiments not construed as dealing with systems.

The basic indeterminability of human response has, of course, been recognized for a long time. Philosophers and psychologists have pointed

out repeatedly that behavior is an interaction among different kinds of things and that it is arbitrary and misleading to say that one of the things (usually the animate one) is doing the behaving while the others make up the environment. Thus, we say that we are studying the behavior of a man walking (1) and not the behavior of the ground under his feet. Yet, of course, the walking behavior would be impossible without the ground, just as it would without the man. Both, and much else besides, are necessary for the walking to occur, and any measurement of the behavior reflects the characteristics of all of the interacting objects and forces.

Now all this is of very little consequence to psychology so long as the parts of the human's environment which interact with his motor output remain unchanged during an experiment. If, in the walking study, the ground underfoot was always of the same general firmness, levelness, and texture, its contribution to the behavior could be neglected. Similarly, if in a tracking investigation the S always used the same joy stick working through the same system dynamics, it matters not a whit that the performance measured is that of the man-job stick system and not of the man alone.

But let the properties of the objects to which the man applies force be varied, unknowingly or deliberately, and it becomes vital to recognize the contaminated nature of the performance measure. Change the ground from hard to muddy, or the tracking control from joy stick to handwheel, and the altered performance resulting is a composite of direct effects and man-environment interactions impossible to untangle without further research. When this is not recognized and the behavioral shift is attributed exclusively to the man, one blunders scientifically.

Conventional psychology has generally avoided this problem of confounded dependent variables by working much more frequently with sensory and state-of-the-organism parameters than with human output variables. Engineering psychology, however, has deliberately undertaken to work with system variables, with the result that the performance measures are almost never pure human response scores. Although this repeated experience has alerted some of the experimenting human engineers to the inferential pitfalls of blindly equating system performance with human performance, there are still those who fall into the trap. One still occasionally hears said, for example, that human tracking performance is improved or degraded by changes in the nature of the control or by alterations in the control dynamics. Such statements may be true but they are certainly not justified, for tracking performance, as measured, is system behavior which can change radically as a result of altered dynamics without reflecting any comparable change on the part of the man.

But it is not only the dependent variable which gives the human engineer trouble in making psychological hay out of systems studies. The

independent variables are often even more troublesome because they frequently embody many parameters. Consider the independent variable in our example. When the pogo stick is substituted for the bicycle, actually four sets of dimensions are involved. First of all, the controls are shifted; pedals and handlebars are traded for a spring-mounted step and a pole. Secondly, the system dynamics are changed as they relate to the transformation of human energy into motion along the ground. Third, the sensory inputs to the boys are modified (the displays are altered, so to speak): with the pogo stick the visual world bobs up and down, with the bicycle it glides by; with the pogo stick the boy's weight is all upon his feet, with the bicycle he feels pressure from his seat. Finally, the operator's task is completely transformed: the psychomotor performance of hopping up and down along a Z axis while simultaneously maneuvering along X and Y coordinates, through shifting balance around these axes, is an entirely different stunt from controlling in X through balancing around X, steering around Z, and pedalling around Y—the latter is the task of the bicycle rider.

Now even if one had a measure of human performance as a dependent variable, which one does not, it is clear that next to nothing of psychological interest could be learned by manipulating this multiparameter, independent, system variable. Since the displays, the controls, the dynamics, and the psychomotor task are all varied simultaneously, the logic of experiment is so completely violated that it is impossible to partial out the individual effects of any of the components upon the performance of the system or of the man. All that one can know in such a systems test is the combined effects of the dimensionally massive, independent variable—in other words, that one system is better than another. This is of value in deciding between systems, but it may be suggested that it is impoverished psychological research.

Of course, our example is a *reductio ad absurdum* intentionally. In many systems experiments, the independent variables are less complex than in the illustration. Yet it is almost always true that system variables comprise more diverse dimensions than do the variables customarily chosen for psychological analysis.

But it is not just the complexity and dimensional confounding typical of system variables which make it hard to derive psychologically relevant facts from man-machine systems tests. A further difficulty stems from the shift in the operator's task (already alluded to) which so often results from the manipulation of the physical parameters of the system. We have pointed out that the psychomotor processes involved in riding a bicycle are entirely different from those underlying hopping about on a pogo stick. Similar radical differences in the operator's task are often to be observed when real systems are compared. One system may require the operator to act analogously to a complex differential equation-solver,

while another may require of him nothing more than proportional responding. One radar warning system may require the operator to calculate the threat of each target and to indicate the most threatening; another may compute the threat automatically and place a marker around the target to be signaled.

Clearly, the operator's tasks differ so much from one of these systems to the next that it would never have occurred to a psychologist to compare them. The differences are so gross, so obvious, that they obscure the need for relating the tasks, for placing them on some kind of a useful continuum and for scaling the distances in between. Yet these behaviors must be compared in some way and the knowledge made available to engineers if the human is to be employed effectively in man-machine systems. Changing the operator's task from one of these complex psychomotor processes to another may produce startling improvements in system performance, and the principles determining the substitution of the task must be discovered if systems design is to progress.

But can we consider this to be good psychology? Do those who regard themselves as scientific psychologists wish to spend their time comparing and analyzing vastly dissimilar psychomotor tasks? Is it sophisticated psychology to compare the speed of running with that of walking, or the ability to add in one's head with that of adding on a machine calculator, or the skill of playing a piano with that of operating a phonograph? I think that most psychologists would agree that, although these kinds of comparisons might be relevant to systems design, they are not quite the stuff out of which conventional psychology is made. Likewise, many would no doubt agree that the contaminated variables of systems research are to be avoided whenever possible in psychological investigations. Some might even go so far as to put the two together and suggest that the time spent by psychologists in evaluating systems is a dead loss to the science of psychology. Of such a view we will have more to say shortly.

Engineering Properties of the Man. The third and final way in which psychologists help in the design of machines is through studying, by conventional means, the behavior of the man as a machine operator. Although, as has just been remarked, psychologists have not yet quite brought themselves to making systematically the gross comparisons required by the system designers, they have undertaken to study selected aspects of the behavior of the man as a system component. The intent here is to provide the engineers or the technologically-oriented psychologists with information concerning certain of the characteristics of the man in order that the properties of the machine may be made to harmonize with them.

In contrast to the other two types of assistance furnished, this is precisely what psychologists would be expected to do. Furthermore, with the exception of some experiments on displays and controls which are

actually masked systems tests employing confounded variables, the psychology is both satisfying and sanitary. The preponderance of the work is unambiguously directed toward discovering laws of human behavior, and it is as scientific as ever one could wish.

However, although the work in this domain of engineering psychology is every bit as respectable as that of the parent subject, it is far more limited. Whereas psychology in the generic sense embraces all manner of human action, engineering psychology deals with a much more restricted variety of behavior. This class of responses may be characterized in a number of different ways:

1. First off, as was pointed out at the very beginning, the human in a man-machine system can be considered as an information transmission and processing link between the displays and the controls of the machine. When so viewed, his behavior consists of reading off information, transforming it mentally, and emitting it as action on the controls. Thus, the performance may be described as of the type in which the operator's responses image in some way the pattern of sequence of certain of the input events. For example, the *S* signals when a tone comes on and withholds his response when he hears nothing, or he presses one key when he sees a red light and a different key when he sees a green one, he perceives the range and bearing of a radar target and identifies its location verbally, he moves a cursor to follow the motion of a target image. In all these cases, the essential interest in the behavior focuses upon the correlation in space and time between events in a restricted and predefined stimulus "space" and corresponding events in a preselected response "space."

2. Another way to characterize the behaviors studied in engineering psychology is to indicate that they are voluntary and task-directed or purposive. The operator of a man-machine system is always consciously trying to perform some task. Perhaps it is to follow on a keyboard the successive spatial positions of a signal light, perhaps to see a visual target imbedded in "noise" and to signal its position, possibly it is to watch a bank of displays in order to determine malfunction and to take action where necessary. In all cases, the operator is voluntarily trying to accomplish something specific; he is not just free associating, or living.

3. A third characteristic of the human operator's behavior emerges as a corollary of voluntary control. The class of human responses of interest to the engineering psychologist involves chiefly the striate muscles. Because it is through the action of this type of effector that men speak and apply force to levers and handwheels, it is these muscles which play the dominant role in the human's control of machines.

4. Finally, practical considerations dictate that vision and audition be the sense modalities most often supplying the input to the human transmission channel. Because of the nature of their high informational capac-

ity, they are ideal noncontact transducers for signal energies emitted by the mechanical or electronic displays of machines.

These four characteristics define the human reactions investigated in engineering psychology as falling within the narrow confines of the classical category of "sensorimotor" or "psychomotor" behavior. But actually, the subject matter is even more limited than this. As was mentioned earlier, the main task of the psychologist-human engineer is to provide system-relevant facts concerning human behavior, and it must be emphasized that not all facts, even though they concern psychomotor performance, can meet this criterion. The hundreds of studies conducted with the pursuit-rotor, for example, have generated very few facts having the remotest relation to the design of systems.

Because it is recognized that not all good sensorimotor psychology is necessarily good engineering psychology, steps are being taken to get at the kinds of behavioral information which the engineers really need. In order to do this, the concepts and models of orthodox psychology are beginning to be replaced by physical and mathematical constructs and engineering models. We have already encountered the notion of the man as an information channel. Systems psychologists also view him as a multipurpose computer and as a feedback control system. The virtue of these engineering models is that they furnish ready-made a mathematics which has already proved itself of value when applied to the inanimate portions of the man-machine system and which may turn out to be useful for the human element as well. In addition, they provide the behavioral scientist with a new set of system-inspired hypothetical constructs and concepts which may redirect his research and stimulate entirely novel lines of inquiry.

Whereas orthodox psychomotor psychology still speaks in a construct language consisting of terms like stimulus, response, sensation, perception, attention, anticipation, and expectancy, the new "hardware" school is rapidly developing a concept argot which, although quite unintelligible to outsiders, is providing considerable inspiration to the initiates. Human behavior for this psychological avant-garde is a matter of inputs, outputs, storage, coding, transfer functions, and bandpass.

And this is far more than a matter of language. The research itself is changing. Questions about human behavior are now being asked experimentally which were literally inconceivable a few years ago. Yet they are the very questions to which engineers desire answers. How stationary and linear is the man? What frequencies can he pass and how many bits per second can he transmit under a variety of different conditions? How does the human's gain change with different systems dynamics? How well can he perform as a single integrator, or double integrator, or triple integrator? How effectively can he act as the surrogate for different com-

puter functions? These are some of the experimental questions which engineering psychologists are beginning to ask and which, no doubt, will be asked with increasing frequency as the new field develops.

It is probably not too much to expect that one day soon we will have a completely revised textbook of human engineering, perhaps entitled *The Engineering Properties of the Man,* which will present to engineers in a form which is useful to them the system-relevant facts of psychology as then known. Instead of conventional chapter headings like "Seeing," "Hearing," "Speaking," "Moving," and "Working," it might contain such rubrics as "Mechanical Properties of the Man," "Transduction," "Informational Capacity and Bandwidth," "Linear Properties of the Man" (including analogue addition, integration, differentiation, and multiplication by constants), and "Nonlinear Properties of the Man" (including, it must be confessed, most everything else). Such a treatise, when it is written, will certainly be welcomed by the system designer, and he will waste no time in putting the information to use. Its reception by the orthodox psychologist, however, is somewhat more unpredictable, and it is conceivable that he will consider it, and the research programs which fed into it, more in the nature of an esoteric horror than a blessing. Certainly it must be expected that this "brave new world" of mechanomorphic psychology will, at least at first, be as limited in its appeal as it is in its coverage.

Engineering Psychology and Science. We have now had a look at the three ways in which psychologists contribute to the design of machines. We have seen that they act not only as scientists, seeking knowledge for others to use, but also as technologists, actively participating in the planning and design of man-operated mechanisms. In playing the latter role, they have clearly stepped out of their field and entered that of engineering. Even as scientists they seem to have moved away from psychology as classically conceived, for on the one hand they have expanded their subject matter to include the behavior of systems, while on the other they have restricted their interest in human performance to a narrow class of system-relevant psychomotor behaviors.

Must we conclude, therefore, that human engineering, in serving the system designer, will only draw from psychology and not contribute to it? Such might seem to follow from what has gone before, but such a conclusion is almost diametrically opposed to the one which will now be offered. I should like to suggest that the involvement of psychologists in the design of man-machine systems is one of the most important events that has occurred in psychology. I believe that, when psychologists started tinkering with machines and seriously trying to learn how they could better be designed, an opportunity was provided for something to happen of utmost significance to science. And I think it has already begun to

happen. This is the destruction of the barrier which has hitherto existed between the psychological sciences and the physical sciences.

Psychologists have conventionally thought and talked in a construct language which is different from that of physics. Traditionally the concepts of psychology tend to be relatively imprecise. At first, this indefiniteness was regarded as almost a necessity; for while physics dealt with physical things, psychology dealt with the mind, and of course the mind was nonobjective. Then later, the mind was abolished, and psychology became anthroponomy, the science of human behavior, and there was less excuse for metaphor. Yet metaphor is with us still, although officially outlawed and in disgrace.

But even when similes are avoided and the concepts are given precise operational definitions, the construct language of psychology is very different from that employed in the physical sciences. First of all, the vocabularies are as dissimilar as are those of English and German. Secondly and more important, the constructs themselves often differ in the nature of their generality, elegance, and fruitfulness, with those of physics far in the lead. Although psychologists have become more scientific in their instrumental procedures, using better and better research tools and employing statistics of ever-increasing power, they are still working with pretty much the same old types of syntactically impoverished concepts. Today we conceptualize the man as doing the kinds of things which he and other creatures with minds have always done: like perceiving, thinking, learning, forgetting, living, and dying. This has tended to result in a perseverative replowing of the same ground, a redoing of the same experiments.

Since psychologists have not conceived of the living organism as an analogue device capable of imitating a wide variety of mathematically describable physical operations, no construct terms have been added to the vocabulary of psychology which overlap directly with those of physics or engineering. Because of this, there has never been any real possibility of describing the behavior of both the man and of the physical objects and events in his environment in the same terms. The language of psychology has had to be used to describe the behavior of the man; the language of physics, the environment. Of course, never before was there a need to develop a scientific notation in which one could express with equal facility the operation of minds and the working of mechanisms.

But that need has now arisen. The advent of human engineering—when psychologists for the first time began to look carefully at mechanical and electronic processes and engineers started to consider seriously the characteristics of human behavior—brought the problem into sudden, clear focus. *One just could not effectively design complexes embodying both men and machines so long as the two components were conceptualized as being entirely different and behaviorally unrelated.* Universal concepts

applicable equally to humans or mechanisms were needed. A meta-language of action became a necessity!

The emergence of the systems viewpoint was essential to this important, although simple, intellectual discovery. It made two things obvious for the first time. It drew attention to the fact that in many circumstances the behavior of the man was inseparably confounded with that of the mechanical portions of his environment. This meant the psychologists often could not study human behavior apart from that of the physical and inanimate world—that all along they had been studying the behavior of man-environment systems and not that of the men alone. The inseparability of the behavior of living organisms from that of the physical environment with which they are in dynamic interaction certainly argues against maintaining separate sciences and construct languages: one for the environment, the other for that which is environed.

But the concept of the man-machine system does more than this. Not only does it emphasize the dynamic inextricability of the man and the machine with which he works, it suggests that human and mechanical processes are to some extent interchangeable, although not necessarily equally precise. Thus, the system designer has the choice of having required computations performed by a mechanical computer or by the man —the process is the same in either case, although the accuracy may be vastly different. Again, this recognition that human behavior and mechanical or electronic processes can be surrogates for each other provides an excellent reason for seeking to conceptualize men and machines in terms of the same models.

Engineering psychology has begun to do this as we have already seen. It is beginning to adopt engineering techniques, to ask experimentally how well men can differentiate or integrate or amplify, how their gains change or their frequency response characteristics shift. It is starting to apply to human behavior the trans-science concepts and methods of information theory and feedback servo analysis. It has begun to use cybernetics, not just talk about it.

In short, in starting to contribute to the design of machines, psychologists have begun theoretically and pragmatically to pull together the psychological and physical sciences. Just how far they can be moved toward one another at the concept level has yet to be seen. Certainly today there are no physical or engineering models which are sufficiently complex to be used profitably with any but the most primitive of human behaviors. But, then, there are no models of any type, hardware or software, which are satisfactory.

One can only look at what has already been accomplished, apply his own hunches and prejudices, take a deep breath, and guess. My guess is that psychology, biology, and physics will some day all employ the same physicomathematical meta-language when describing the behavior of

those particular system components which fall within their purview. Furthermore, should this ever come about, it will have resulted, at least in part, from the efforts of psychologists to design machines.

Reference

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2. Effect of Design on Accuracy and Speed of Operating Dials *

Roger J. Weldon
George M. Peterson

Equipment is sometimes controlled directly; that is, the action of the equipment is observed and the controls adjusted to bring the action to a point desired by the operator, as in steering a car. In such cases, corrections are made as errors are discovered during operation. In other cases, equipment is controlled by presetting information into it, as in setting an alarm clock to go off at 6 A.M. Frequently, when information is set in this manner, there is a point in time after which an error cannot be corrected; an example would be the case where a computer is prepared completely before computations begin and cannot be altered while the process is going on.

Some preset operations are sufficiently important so that it is of some consequence to prevent errors from being set into the equipment. This practical consideration led to the study reported here, in which three types of dials were investigated to determine the comparative accuracy with which information is set into them. The two criteria of merit used were the number of errors made in setting and checking the dials and mean time taken to set and check them.

Although there is a considerable amount of literature upon the reading of instruments, there is very little upon the operation of setting information into instruments. Actually the only study located on this latter operation was that of Bradley (1) who tested a number of varieties of the open-window type of dial (moving scale). Chapanis (2, p. 137) and Sleight (4, p. 171) refer to unpublished studies on counter dials, adding

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that such counter dials are not best for setting information into instruments. The present authors have not been able to obtain these studies.

Method: [1] *Dials Tested and Equipment Used.* The three types of dials investigated were all general-purpose, multiple-turn dials on which a three-digit number could be set precisely. The knobs of all dials turn 10 complete revolutions to cover the range from 000 to 999. There are no stops at the ends of the range, and there is some irregularity among the dials as to the action outside the range, but this was not considered important for the results.

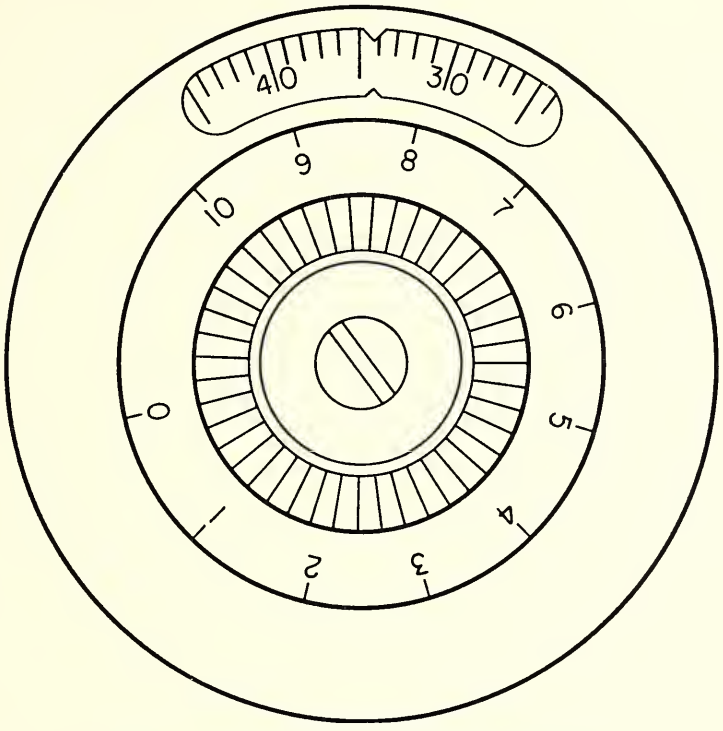

FIG. 1. Type I dial. This dial reads 834.

Type I dial (Fig. 1) is a standard commercial dial which has two concentric scales that move past a pointer. The pointer, which is at the 12 o'clock position, indicates the reading on the scales. The outer scale, which moves directly with the knob, has 100 graduation marks, every tenth of which is marked by a number, from 0 to 100. The last two digits (right digits in a setting) are read from this scale. The inner scale moves at about one tenth the speed of the outer scale and carries 10 numbers, from 0 to 10, without graduation marks. The first digit (left-hand digit) is read from this scale.

Type II dial (Fig. 2) is strictly an experimental dial, built upon the mechanism of a commercial dial of a different type from Type I dial. In this dial, the knob controls an inner concentric scale directly, while the

[1] For a more detailed description of equipment and procedure, see (5).

outer scale moves one-fifteenth of a revolution when the inner scale moves past a critical point (a Geneva movement). The dial is covered and an open window put at the 9 o'clock position. The numbers are placed upon the moving scales in such a way that the first two digits of a setting are read directly, left to right. The last digit is read by noting the position of a mark on the inner moving scale against a fixed scale next to it. Complex as it may seem to describe, the operation of the dial proved to be quite simple.

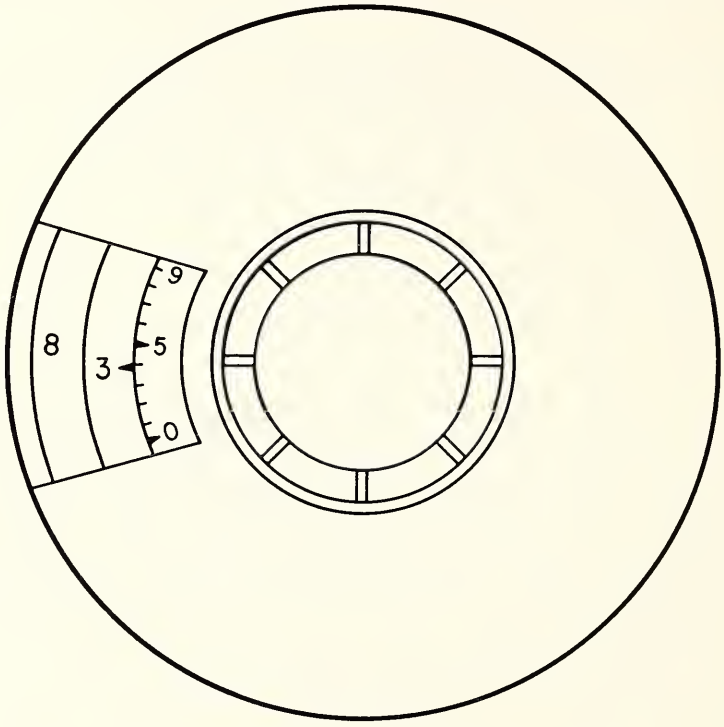

Fig. 2. Type II dial. This dial reads 834.

Type III dial (Fig. 3) is a commercial counter dial, with all three digits of the setting showing as numbers in the center of the dial, as on the mileage indicator of a car. The control knob is on the outside or periphery of the dial mechanism. The experimenters dubbed it the "barrel" dial, which is quite descriptive in that the whole outside barrel was turned and the numbers appeared on the stationary "head" of the barrel. Another type of counter dial was also tested in the experiment with results very similar to results for this dial. Therefore the results of the two are combined in this report.

The dials were set up on an inside wall of each of two booths. To one side of the dials was a clock which, through electric controls, recorded the intervals during which a subject stood before the dials. A camera and floodlights were mounted on the opposite wall with which photographic records were made of the settings and checkings made by subjects and the time taken to make them. The experimenter's station was between the

two booths, and from there he could operate the equipment and control the progress of the experiment.

Procedure. Subjects (Ss) were 206 male students at The University of New Mexico. Of these 206, 40 worked under flashlight conditions and the data of 42 were discarded to equalize groups, as will be discussed shortly. Thus the results given in this report are based upon the data from 124 Ss. Since this study includes several separate experiments, the numbers of Ss working on the various types of dials differ; these numbers are shown in Table 1.

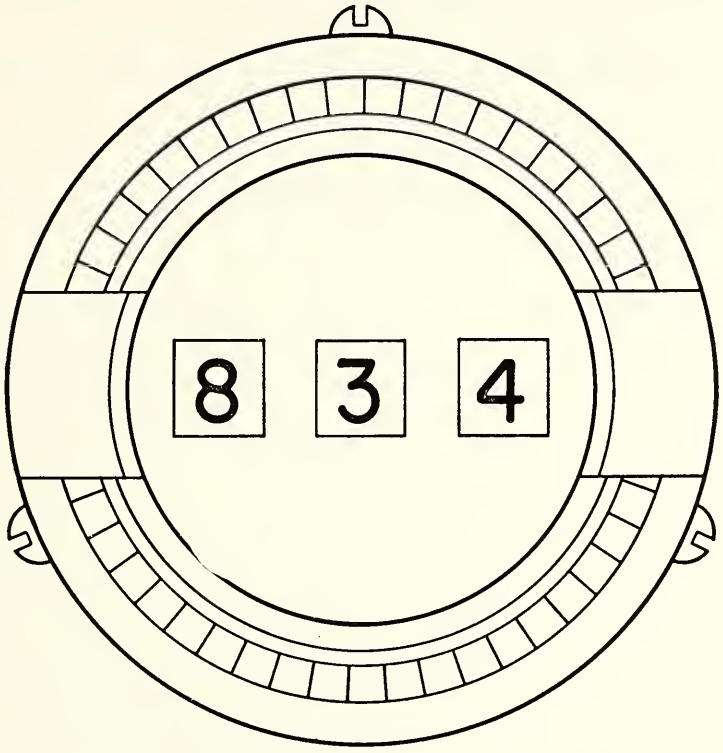

FIG. 3. Type III dial. This dial reads 834.

No S operated more than one type of dial; therefore, some comparison of Ss was necessary, independent of their record in dial operations. To obtain such a check, information about Ss, such as age, scholastic grade, and dial experience was obtained. Also visual tests on the Ortho-Rater, part of the Minnesota Clerical Test, and a Dial Booklet Test were given. The Dial Booklet Test consisted of a series of photographs of the dials being tested, from which Ss read and recorded the settings shown.

After Ss had taken the preliminary tests mentioned above, the experimenter took them to the booths containing the dials, explained the dials and other equipment to them, and gave them practice in setting the dials. The Ss then, working in pairs, went through the following steps:

1. Each S picked up an instruction card from a stack of cards arranged in proper sequence, at the door of the booth in which he was to work first.

The card told him to check a number on the dial. (This number, in the first operation, had been set by the experimenter.) The S then entered the booth and checked the dial setting, making a correction if necessary, then deposited the instruction card where it could be photographed, and left the booth.

2. After photographs were taken, each S picked up the next instruction card from the stack and re-entered the booth. This time he set a new number on the dial and left the booth.

3. After photographs were again taken, each S changed booths, picked up the appropriate instruction card, and checked the setting of his partner.

4. Finally, Ss set new numbers on the dials in the same booth before reversing again.

The above cycle continued until each S had made 50 settings and 50 checkings, and a few extra in case some within the series were for any reason lost. The experimental period lasted from one to two hours for a pair of Ss.

In addition to the errors set on the dials, additional errors were introduced for the checker by making his instructions different from those of the setter in 10% of the numbers he was to check. In these cases, although the setter may have made no error, the checker following him would find a setting that differed from his instruction number, and thus an "error" to be corrected.

Various dials were tested under several varying conditions. One of these conditions was the number of dials on a panel. Panels of one, five, and ten dials were made up of Type I and Type II dials. (There were only two Type III dials available.) In one series of operations the booths were darkened and Type III dials were set and checked under flashlight illumination. Actually flashlight illumination can be quite high at the point of reading, but it is, of course, uneven and requires the use of one hand.

The main results to be reported here were obtained under "normal" illumination. Under these conditions two factors were not separated experimentally. These factors were the height of the dial from the floor and the level of illumination at the dial. Since there was overhead lighting in the booth (from two sources to avoid serious shadow effects) the illumination automatically decreased for the lower dials. Dials were placed 36, 42, 48, 54, and 60 inches above the floor. The corresponding illumination levels were 10, 12, 15, 23, and 30 footcandles, respectively. It was anticipated that the effects of both of these factors, if any, would be to increase the errors on the dials nearer the floor.

Results. No significant differences appeared among the results for the factors of number of dials on the panel, flashlight illumination, or for height of dial above the floor and the accompanying shift in illumination.

Before giving results on the different dial types it is necessary to consider whether the several groups setting the different types showed differences on the control variables. Little difference was found on the following three: age, educational level, and near visual acuity. However, the group working on Type III dial indicated greater dial reading experience and made fewer errors on both the portion of the Minnesota Clerical Test used and on the Dial Booklet Test. For this reason product-moment correlation coefficients were computed between both setting errors and checking errors on the one hand and the above three variables on the other, taking the groups on the three types of dials separately.

The correlations between dial experience and setting errors were —.27, +.37, and +.04; and between dial experience and checking errors were —.21, +.42, and +.03. Because of the lack of consistency among these coefficients the factor of dial experience may be disregarded.

The correlations between percentage errors on the portion of the Minnesota Clerical Test and setting errors were +.15, +.29, and +.15 for the subjects setting the three types of dials; and between these percentages and checking errors they were —.03, —.12, and +.03. The correlations between the Dial Booklet Test and dial operation errors were higher. For setting errors they were +.43, +.76, and +.18; and for checking errors they were +.41, +.39, and .00.

To utilize the information obtained from these two control variables, the three groups of subjects working on the three types of dials were equated for scores on both the portion of the Minnesota Clerical Test and on the Dial Booklet Test. This was done by discarding the data for 42 Ss with the extreme high or low scores on the two tests as required to obtain nearly equal mean scores. The effect of this operation is shown in Table 1. The upper part of the table shows various statistics before equating groups and the lower part of the table shows the same statistics after equating. Scores on the two tests are fairly well equalized but the differences among the setting errors on the different types of dials remain. This is also true of checking errors, which are not shown.

The results for the setting operation after the three groups were equated on the basis of the two tests are summarized in Table 2. The statistics in this table show that less than half as many errors were set on Type II dial, and less than a third as many on Type III dial, as were set on Type I dial. A Chi Square test of the number of subjects setting 0, 1, and 2, and more than 2 errors on each of the three dials shows a significant difference between Type I and Type II dials at the .01 level of confidence. This test does not separate Type II and Type III dials; but Type I and Type III dials differ at the .001 level.

Checking errors are those errors which are to be located and corrected by the checker but which are missed by him or wrongly corrected. A checking error thus represents a final error when a set and check system

is used, as in these experiments. Thus the percentages of checking errors measure the over-all efficiency of the dial operations. These percentages are given in Table 3. The results in this table bring out more strongly the increase of accuracy to be obtained on Type II and Type III dials.

TABLE 1. COMPARISON OF SUBJECTS AND SCORES BEFORE AND AFTER EQUATING GROUPS

Before Equating			
	Type I Dial	Type II Dial	Type III Dial
Ss	72	36	58
% errors on Dial Booklet Test	6.1	6.4	2.6
% of errors on part of Minnesota Clerical Test	2.7	2.5	1.7
% setting errors on Dials	6.06	2.88	1.55
After Equating			
	Type I Dial	Type II Dial	Type III Dial
Ss	52	26	46
% errors on Dial Booklet Test	3.0	3.2	3.1
% errors on part of Minnesota Clerical Test	1.8	1.9	1.8
% setting errors on Dials	4.96	2.31	1.52

Only one-third as many errors are left on Type II dial as on Type I dial, and slightly more than a fifth on Type III dial. Because of the smaller numbers of errors a Chi Square test can be made only on the basis of the number of Ss making none and Ss making one or more errors. Such a test shows that Type I dial differs from Types II and III dials at the .001 level of confidence, and the Types II and III do not differ significantly.

Ss set and checked Type III dial faster than Types I and II, and significantly so. Table 4 gives the average time required to operate the dials.

Discussion. In this experiment, the counter-type dial (Type III) proved to be superior to the other types of dials. It was significantly better than

TABLE 2. SETTING ERRORS BY TYPES OF DIALS

Type	*Ss*	Settings	Errors	% Error
I	52	2,600	129	4.96
II	26	1,300	30	2.31
III	46	2,300	35	1.52
Total	124	6,200	194	

Type I dial in both accuracy and speed. It was significantly faster to operate than Type II dial. Although consistently more accurate than Type II dial, Chi Square tests did not show the differences between them to be significant. It is difficult to find a test that takes into account all the data in the experiment. It is the writers' opinion that Type III dial is superior to Type II dial, as exemplified in the present experiment, because of the small numerals on the latter.

Table 3. Checking Errors by Types of Dials

Type	Ss	Checking	Errors	% Error
1	52	2,600	103	3.96
II	26	1,300	17	1.31
III	46	2,300	19	.83
Total	124	6,200	139	

The results are somewhat contrary to results indicated in previous studies (**2, 4**), which showed that the counter-type dial was not efficient for setting information into equipment. It is quite possible that the difference of results may be accounted for by the effect of adding another digit to be set on a counter-type dial. For a four-digit number, the knob would have to be turned 100 revolutions, using the present gear ratios. For a five-digit number, it would have to be turned 1,000 revolutions. Probably this many turns would be prohibitive for the four-digit number and certainly so for the five-digit number. However, the design might be improved to overcome this difficulty.

Type II dial did not have a fair test in this study because of its size limitation. The fixed scale and the numerals on it, from which the last digit was read, were below standard size. This led to a large number of errors of 0.1. If the outside dimensions of the dial were made 2.5 in. or larger instead of the present 1.75 in., this type of dial probably would be set and checked with an accuracy approaching that of the counter dial. An added advantage to Type II dial is that it is of relatively simple construction.

Without question, Type I dial is difficult to read. It has characteristics which promote the so-called 10 errors (**3**), that is, the dial is frequently

Table 4. Mean Time to Set and Check the Types of Dials

Type	Mean Setting Time (sec.)	Mean Checking Time (sec.)
I	12.2	7.0
II	12.3	6.2
III	9.8	3.8

overread by 1.0 or 10.0. Experienced operators, no doubt, learn to set and read this dial with considerable accuracy, but such an operation is nevertheless a relatively complex psychological feat compared to operating Type III dial.

Summary

Three types of multiturn dials, on which a range of numbers from 0 to 999 can be set, were tested for accuracy and speed in setting and checking. The results of 6,200 setting and 6,200 checkings made by 124 college students are reported. A commercial counter-type dial was found to be significantly more accurate than a commercial scale-type dial. Speed of operation was also significantly faster on the counter-type dial. An experimental-type dial of a modified scale design was found to be almost as accurate as the counter dial, although slower to operate. Because of its simplicity it should have a useful place in dial-setting equipment provided its design is improved to bring its scale and numerals up to recommended size.

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3. Four Basic Ideas in Engineering Psychology *

Franklin V. Taylor

The Human Has Limitations. Engineering psychology began with the intellectual discovery that the human was not a perfectly adaptable organism. Of course, no one had ever formally asserted that the man was perfectly adaptable, but up until a few years ago the applied psychologist acted as if the human's flexibility were sufficient to make possible all important adjustments between man and his environment. We now know that this is not so. All of us are aware of how, during World War II, the approach of designing the task to fit the operator was added to the more traditional psychological procedures of selecting and training operators to fit their jobs. This was necessitated by the variety and complexity of military equipment. Machinery had finally outrun the man's ability to adapt. And the recognition of this fact was the first important insight in the development of engineering psychology.

Since then, many other ideas have emerged in the course of trying to fit tasks, tools, and equipments to the man. Although it is certainly difficult to judge the significance of events and ideas which are historically too close to one's eyes, as are all things in engineering psychology, three further ideas seem to me to be sufficiently important to allow them to be placed on a par with the first as effecting major changes in the direction of the engineering psychologist's thought and action. It is the purpose of this article to identify these basic ideas and to discuss their implications for the science of psychology.

The Concept of the Man-Machine System. Although it is hard to discern any historical sequence in a sample of time as short as that spanning the existence of engineering psychology, one important concept certainly entered the discipline soon after it began to have substance. This was the notion of the man-machine system. The term "system" had long been in general use in the other sciences to refer to any configuration of elements in which the behavioral properties of the whole are functions of both the nature of the elements and of the manner in which they are combined. Thus, it had long been common to speak of planetary systems or nervous systems or digestive systems. There were economic systems also

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and political systems. Engineering, too, had its weapon systems and control systems. And it was probably through the extension of the latter that the notion of the man-machine system came into being.

Whatever its origin, the concept made very obvious the fact that one could not hope to design the mechanical portions of a system of which the man was a working part without a knowledge of the characteristics of the human component. Furthermore, psychologists soon found that their subject became acceptable to the engineer when it was tied in to the engineer's way of thinking, through the use of the man-machine system paradigm. One suspects that even today a part of the appeal of the system approach to the psychologist is its demonstrated sales value to those customers who are not used to thinking of psychologists as experts in hardware design. Anyway, the standard man-machine system diagram makes an excellent cover sketch for human engineering advertising brochures!

But, seriously, the system concept has affected psychology in at least two important ways:

Dependent Variables. Man-machine systems are created for two different purposes. One class of systems is constructed to affect the conditions of the human component in that system in some favorable way. Examples are the pilot in his pressure suit, the soldier in his gas mask, the hospital patient in his iron lung, the Harvard student in his teaching machine, and the Yale student in the Sterling Library. In all these cases, the purpose of inserting the nonhuman elements into the system is to improve in some way the well-being or efficiency of the man within the system. With such internally referenced systems, the dependent variable of importance is some indication of the human's state or condition. Thus, the things measured are familiar psychological variables.

However, this is not so with the other type of man-machine system. The purpose of the system in this case is to alter the environment or to change relationships between the system and other entities external to it. The workman with his crowbar or with his bulldozer are examples of this kind of externally referenced system. So also are the pilot and his plane, air traffic control centers, and human-operated gunnery and missile control systems, to name but a few. With these systems, the dependent variable of greatest interest is a measure of the performance of the total system. In reference to the bulldozer, it might be the amount of earth moved in an 8-hour day, or with a missile control system, the hit probability against a variety of targets. In any case, the measure reflects the combined performance of all the components in the system, and not just that of the human element.

The introduction into psychology of a dependent variable which so clearly confounds human behavior with the contribution of the mechanical and electronic portions of the system has not universally been hailed with enthusiasm. As if life were not already sufficiently difficult for the

psychologist without making it even more trying by introducing contaminated performance measures! However, the manifest unwieldiness of these measures is actually a virtue. The experience gained in working with dependent variables which are so demonstrably system measures, rather than human measures, is alerting psychologists to the fact that in many instances they have been working with system performance all along without recognizing it. In some so-called human skills, for example, the man is actually a component in a man-machine system, and it is the performance of the total system and not that of the man alone which the psychologist records and theorizes about. To recognize this is to avoid drawing faulty inferences about human behavior (Taylor & Birmingham, 1959).

Independent Variables. Engineering psychology has introduced many new independent variables which some call task variables and others call engineering variables. They consist of such things as display mode, control mode, input frequency, system order, aided tracking time constant, and display or control configuration. Much of the effort of the engineering psychologist has gone into work with these variables; in fact he has been so preoccupied with them that he has tended to neglect the more conventional psychological variables.

The system concept provides an excellent antidote to this scientific parochialism. A glance at any man-machine system flow chart makes it instantly apparent that the performance of the total system reflects (*a*) the human's level of ability and the extent of his training as well as (*b*) the nature and performance characteristics of the mechanical or electronic system elements. This insight immediately suggests two things: First, it impels those psychologists who are working in industry or elsewhere to take a unified human factors approach and to combine procedures of operator selection and training with those of designing the equipment to fit the man. Secondly, it makes it appear extremely unlikely that these different human factors approaches are, in fact, separate; it suggests that, since the human and the machine components are all cooperating within a single system, there will often be strong interactions between psychological and engineering variables. In part, it is the job of the engineering psychologist to look into these interrelationships and to exploit them whenever possible.

Although there have been relatively few studies in the past which have probed these interactions, one finding which has obtained repeated corroboration is that proper attention to engineering variables reduces the dependence of system performance upon selection and training. A clear demonstration of this is provided by data graphed in Figure 1 (Birmingham, Kahn, & Taylor, 1954). Figure 1A shows the learning curves of six subjects attempting to control through a complex dynamic system something like that of a submarine. It is apparent that most subjects are learning, although wide individual differences appear. Certainly selection and

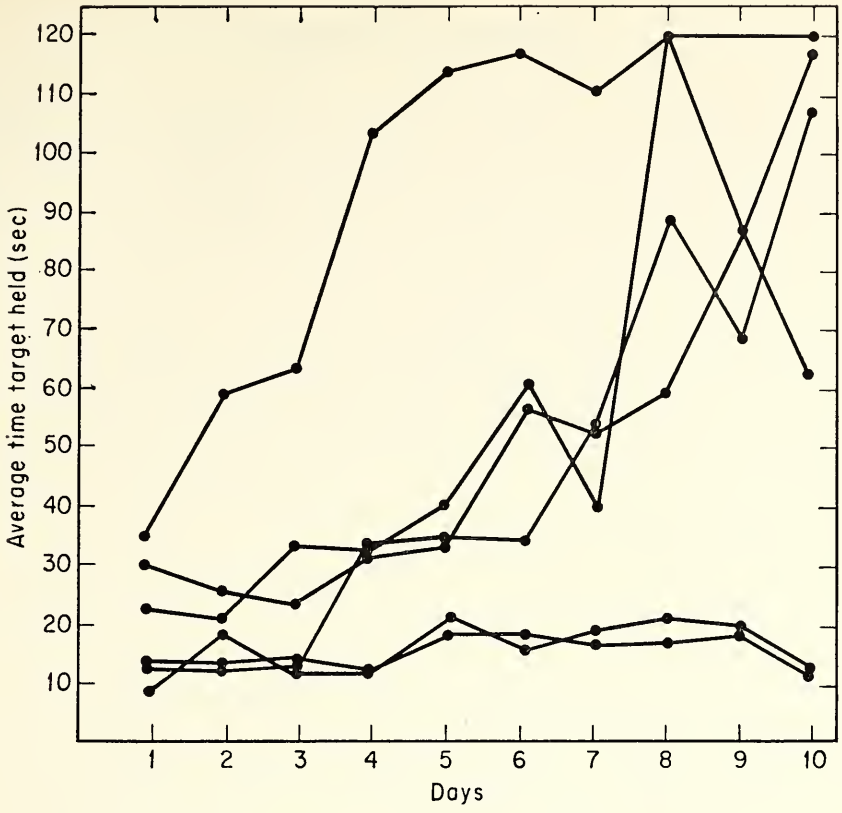
training techniques could be employed effectively with this system. Figure 1B shows the same subjects performing with a modified version of the same device. In this case, although the basic system order has not been changed, equalization loops have been inserted within the system to improve its performance. Now, although the task of the over-all system remains the same as before, the task of the man is considerably simplified.[1]

The result of this is, that with four of the six subjects, system performance is perfect from the start and all subjects eventually learn the task. Essentially, training has become unnecessary and, except for rejecting the one very bad operator, selection procedures would be ineffective. Clearly, here is an example of the powerful interaction between engineering and psychological variables which is a direct implication of the system concept.

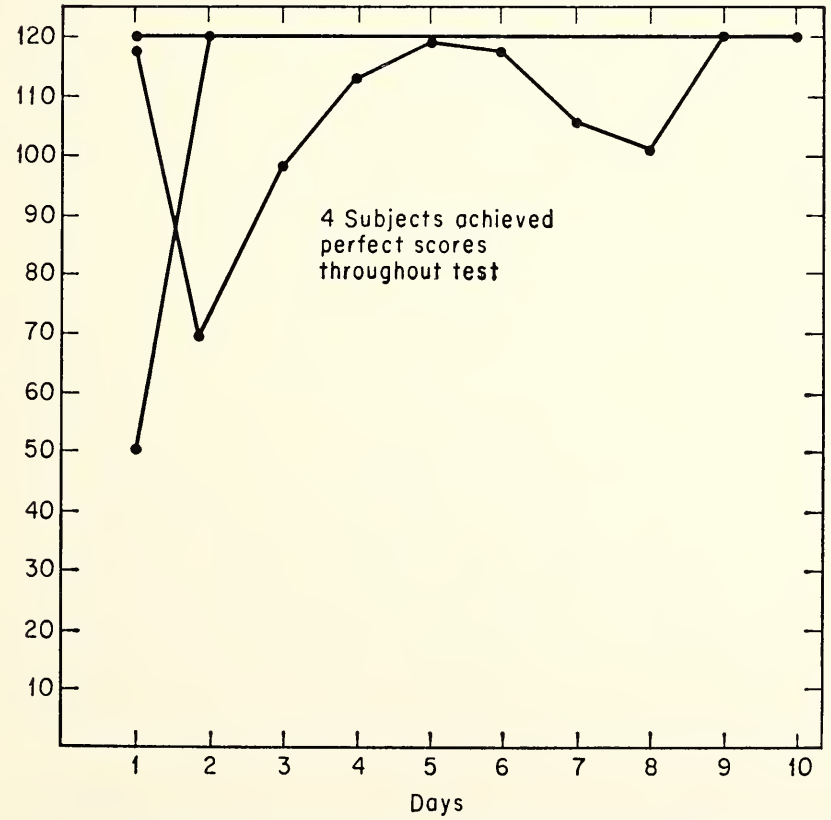
Input-Output Relationships. Much of the early research in engineering psychology dealt with problems relating to getting information into the man or out of him. Unquestionably, the input and output transduction properties of the man are of great importance for the system designer. The knowledge of how to design instrument displays for easy reading and controls for effective operation is absolutely essential for the human engineering practitioner. However, this is but the beginning. In many, perhaps most design situations, it is not the facility with which one can pump information into or out of the man which counts most but, rather, it is what the human must do with this information to transform it into action upon the controls: what mental steps he must take, what computations he must perform, what equations he must solve. In short, it is the information processing task of the operator which is often of overriding importance in determining the performance of a man-machine system. And to a very considerable extent this task is defined not by the human's input nor by his output but, instead, by the relationships that prevail between the input and the output. The recognition of the importance of these relationships I regard as a third significant insight in engineering psychology.

This interest in the operator's task as defined by stimulus-response relationships has manifested itself in a number of research projects which, superficially, might be considered as quite unrelated. Among the first and clearest demonstrations of the importance of this factor are the classic experiments of Fitts and his associates (Fitts & Deininger, 1954; Fitts & Seeger, 1953) on stimulus-response compatibility. Using signal light displays and stylus controls, they demonstrated that speed and accuracy of operator performance increased as the informational dimensions of the display were made more and more isomorphic with those of the control.

[1] Actually, the data plotted in the lower graph were obtained while the subjects were simultaneously carrying out three additional simple tracking tasks.



A. Complex tracking behavior required of the subject.



B. Simple tracking behavior required of the subject.

FIG. 1. System performance as affected by individual differences and practice.

The interpretation given these findings was that the greater the display-control compatibility, the fewer became the subject's data processing steps and, hence, the shorter the processing time and the fewer the opportunities for error. These results and conclusions were corroborated in subsequent studies done by other investigators (Garvey & Knowles, 1954).

Closely related to stimulus-response compatibility are the population stereotypes uncovered by numerous investigators (Fitts, 1951). These expected or preferred directional dependencies between the movement of a display indication and the associated control, undoubtedly affect performance accuracy and, in doing so, again attest to the importance of stimulus-response relationships.

Perhaps nowhere in engineering psychology has the nature of the subject's task proved to be more important than in research with continuous control systems. One effective way to alter what the human has to do in such devices is to change his input-output relationships by varying the dynamics of the system from, say, position control to velocity or acceleration control, or to use engineering parlance, from a zero-order to a first- or second-order system. Another way is to hold the order of the system constant and to change the amount of aiding or quickening within the system. Either way, the human's task is very much modified.

The significance of system dynamics as an experimental variable was not always understood. Before the advent of engineering psychology and the recognition of the importance of the operator's task for the performance of the system, the great majority of tracking studies were carried out with position control devices of one kind or another. The reason for this is quite obvious: a zero-order system is the easiest to construct and seems to be the most "natural" of all following systems. It is the one we use when stirring a cup of coffee or pointing at a blackboard.

However, by confining his attention only to position control—by failing to recognize that system dynamics constitute a powerful set of variables—the pre-human-engineering psychologist was prevented from achieving certain important insights. Quite obviously, for example, he had no way to discover what we now know to be true, namely, that systems of different dynamics respond differently to operator stress (Garvey & Taylor, 1959). Again, as long as only position control tracking was ever tested, a pursuit display was always found to be superior to a compensatory display. However, when system dynamics were allowed to vary, compensatory tracking was found to be superior to pursuit with a first-order system at low input frequencies (Chernikoff & Taylor, 1957).

But by all odds the most serious effect of failing to recognize system dynamics as a relevant dimension was that, until recently, psychologists were blind to the tremendous improvements which could be achieved in system performance by altering the dynamics. So long as the practice

of human engineering is confined to the manipulation of display, control, or equipment configuration variables, a 50% improvement is highly satisfactory, whereas a 100% improvement is a cause for celebration. In contrast, if a 200% change in accuracy does not result from an alteration in the dynamics of a man-machine control system, something is known to be wrong. One system was even made to perform between five and six times better through an adjustment of mechanism dynamics to complement the man (Sweeney, Bailey, & Dowd, 1957). Certainly, such an achievement constitutes a very dramatic affirmation of the importance of the human's input-output relationships in determining the performance of systems composed of men and machines.

Use of Engineering Models. Inherent in the system approach is the idea of an interchangeability of system tasks as performed by men or by mechanical or electronic components. Also, there is an implication in the system concept that inadequate performance on the part of one component can be countered or compensated through the proper choice or design of other components. But these suggestions can be fully exploited only when the behavioral properties of all system elements, whether they be electronic, mechanical, or human, are reduced to the same system-relevant terms. Then, and only then, can one employ anything resembling a strict logic in the analysis and synthesis of man-machine systems. The recognition of this fact and the decision to attempt to employ engineering constructs to describe the performance of the human as well as of all other system components, I regard as a fourth idea of major significance for engineering psychology.

Although both information theory and servo theory have contributed fruitful models to engineering psychology, the servo approach has been the more effective in guiding the system designer. To illustrate how this latter approach has been used, let us follow in outline the process of designing special information handling networks to improve the performance of a piloted aircraft.

1. The first step is to consider the engineering capacities and limitations of the pilot. For example, it is important to know the human's bandwidth in order to avoid demanding too much of the man. Also, the human's precision in carrying out operational transformations such as integration, differentiation, analog addition must be evaluated. In this case, it is not only important to estimate "baseline" precisions but also the way these precisions change in response to such variables as task complexity, fatigue, stress, etc. The human's "gain" and the extent to which it can be altered must be looked into and the "noise" properties of man must be fully considered.

2. Once these and other system-relevant characteristics of the pilot have been examined—and this examination must be largely based upon inference, for very little has been done in the way of quantitative experimentation along this line—the next step is to consider the mathematics of the pilot's task. Figure 2 shows the pilot in a loop where the dynamics consist of two cascaded inte-

grators. These dynamics are something like those of an airplane. The pilot looks at displays (D) and responds by applying force to his controls (C) in the effort to take out wind gusts which constitute the input.

Controlling through two integrators is difficult. Due to the physics of the situation, there is a tendency for such a second-order system to oscillate or hunt from side to side. To stop this oscillation, the pilot actually has to carry out the mathematical processes shown; that is, he has to supply an amplification, two differentiations, and two analog additions. The box labeled T represents his reaction time.

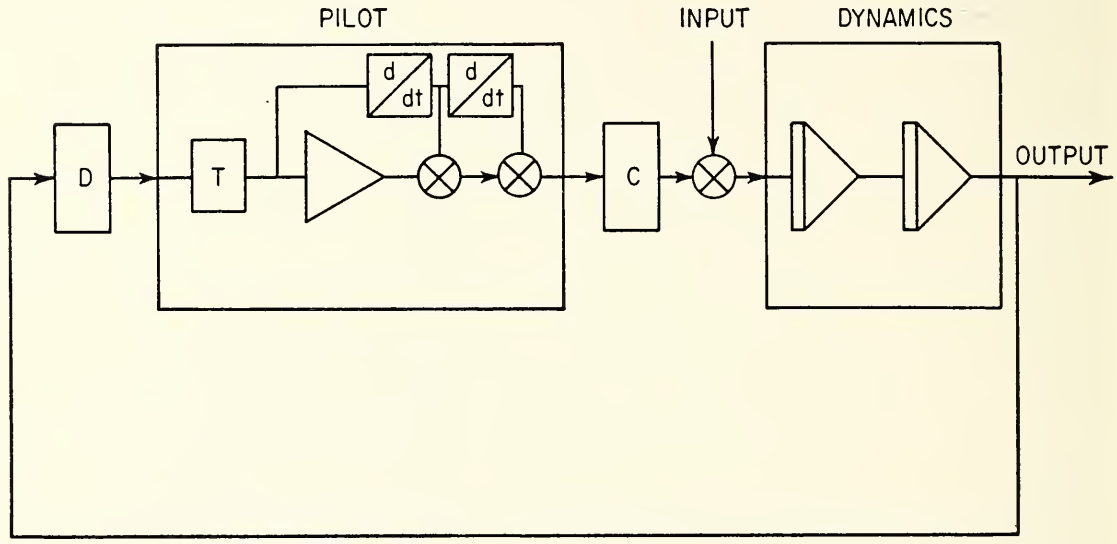


Fig. 2. The pilot and his aircraft, considered mathematically.

Of course, the pilot does not think of his task in this mathematical way. He knows that he has to estimate turning rate and acceleration and use these estimates to anticipate what the plane is doing. But he does not think of these processes as single and double differentiation and analog addition. Yet, this is precisely what they are, for were they not the plane would not long continue to fly the desired course.

3. Having looked at the pilot's engineering properties and having determined the mathematical requirements of the system, the final step is to design the electronics and mechanics so that when all the components, human and nonhuman, perform their function properly, system requirements will be met.

One such design is shown in Figure 3. This is an oversimplified picture of quickening (Birmingham & Taylor, 1954). Although quickening accomplishes several different things, two effects are easily noted. First of all, the differentiations and analog additions are effectively shifted from the pilot into the dynamics. In this way, accurate and relatively noise-free computing circuits are substituted for the low precision, analog mathematics of the pilot. Second, in shifting the bulk of the computation onto the electronic equipment, the pilot is left free to devote all of his bandwidth and other resources to the simple job of amplification which remains.

Here, then, is an example of how one goes about employing an engineering model to help in the design of a man-machine system. That the approach is very effective is suggested by the fact that quickening theory has been used or is being used today in the design of theodolites, radar gunfire control systems, missile control devices, aircraft instruments, drone landing systems, and submarine diving displays. Taking full account of man's system-relevant properties has made for improvements in performance of control systems by as much as a factor of ten (Rund, Birmingham, Tipton, & Garvey, 1957). Thus, viewing the human operator in terms of engineering models is certainly having an important effect upon human engineering technology. Furthermore, as has been suggested elsewhere (Taylor, 1957), it is also influencing our science through broadening our subject matter and our construct language.

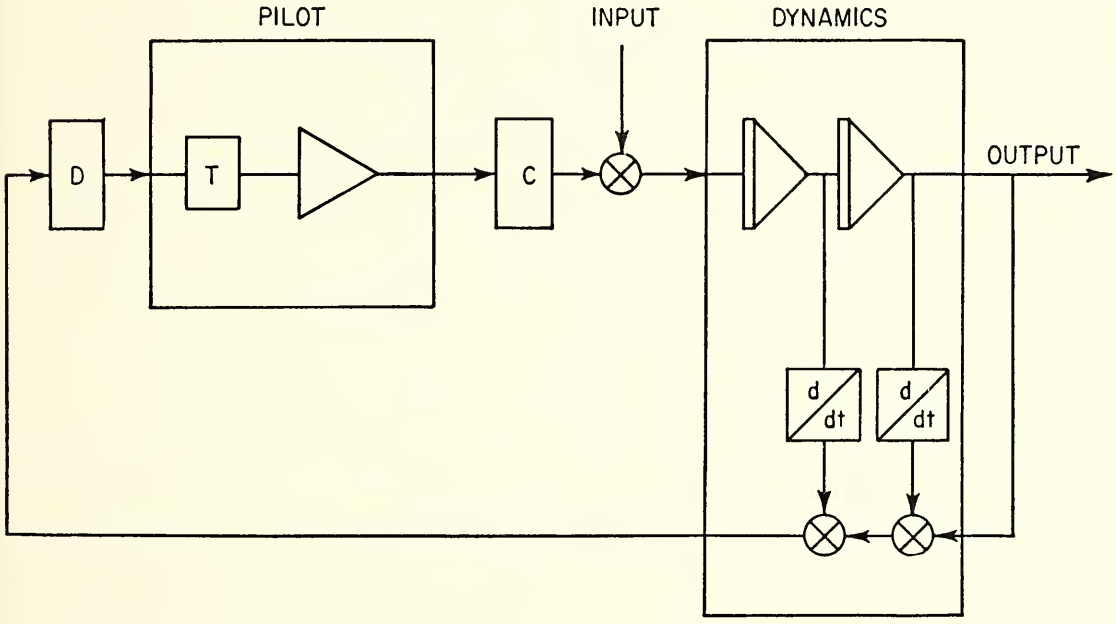


FIG. 3. Quickening of the aircraft control loop.

Epilog. My vote for the four most significant ideas in engineering psychology has now been cast. In summary, these ideas relate to: the limited flexibility of the man, the concept of the man-machine system, the importance of human input-output relationships, and the use of engineering models to describe the behavior of the human elements within a system.

Certainly, I have voted as thoughtfully and as honestly as I could. Yet, in all frankness, I am not satisfied. I have a feeling of incompleteness which I am sure some of you share with me. I fear that these important ideas have helped to illuminate only certain aspects of engineering psychology, while other portions of the field still lie in deep shadow. In concluding I will attempt to suggest why this may so.

With the possible exception of the first significant idea, all of them involve system thinking in one way or another. Actually, the latter three ideas can be viewed as system notions of progressive sophistication, with the simplest being the system concept itself at the level of pure description, the next beginning to specify the role of the human component in terms of input-output relationships, and the fourth providing more precise and useful mathematical descriptions of system-relevant human behavior. Actually, it can be argued that the recognition of the man as insufficiently adaptable to adjust himself to all machines also implies the idea of the human and the mechanism working together as a system, but this will not be pushed. It is enough to note that at least three of the four insights involve the system view and that, therefore, if any one idea can be said to have achieved supremacy in our field it is that the operator and his machine can profitably be considered as forming a single, integrated complex.

My uneasiness then, restated in these terms, derives from my conviction that system thinking has been far less productive for some areas of human engineering technology and psychological research than for others. For example, it seems to have been of little or no real importance in helping in the design of body armor, gas masks, space suits, vehicular seats, library books, sensory aids, and many other physical products made by man for his protection or for the enhancement of his well-being. Of course, all these products must be tailored to the man in one way or another, but such tailoring hardly requires that the man and his product be regarded as two portions of one over-all same thing.

In a similar way, it is hard to show that the system concept per se has improved the design of radios, television sets, cook stoves, vacuum cleaners, and many other household appliances and aids to daily living. Certainly, the housewife and the washing machine constitute a man- or, rather, woman-machine system, but it is doubtful if the recognition of this fact by the washing machine designer has inspired his designs in any important way. Even in the case of such out-and-out systems as shipboard combat information centers and other types of information processing networks, it is hard to show that the human engineer recommends a different design because he recognizes that he is dealing with man-machine systems rather than with a configuration of machines operated by men.

As a matter of fact, I would now like to suggest that it is only in the case of one type of man-machine complex where the system concept has truly been technologically productive. I refer to the closed-loop control systems. All of these, whether they are in submarines, aircraft, or motor skill laboratories, are structured in such a way that the amplitude-time pattern of the input is closely reproduced in the output or at some other point within the system. This is accomplished by feeding back some function of the output into the system input.

It is in the design of man-machine systems of this type where the system approach has demonstrated its greatest effectiveness. On the other hand, for internally referenced systems or for data processing networks such as CICs, air traffic control centers, or air defense complexes, system thinking has been far less fruitful. It is to be noted that these latter systems are either open loop and contain no feedback or they are characterized by feedback which is discontinuous and more a matter of minutes and hours than of milliseconds. It may be suggested, then, that the presence or absence of a tight feed-back loop is the key to the puzzle as to which of the undertakings of human engineering have benefited most from the system viewpoint.

The reason success has crowned the efforts of those working with continuous feed-back systems is that a useful mathematical theory based on automatic systems has been available to the engineering psychologist from the start. Although it is certainly true that servo theory is still undergoing development and that it assumes a component linearity which the human violates in a very fundamental way, it is possible to employ the mathematical logic of servo theory very directly and effectively with man-machine control systems.

Thus, it seems to have happened that when the engineering psychologist needed a model for the man as an element in a tracking or control system, he found one ready-made. But for the other roles which men play in systems, no equally fruitful models have been developed. True, information theory has stimulated considerable research on the human as a straight information transmission device. Yet this has not been too helpful for the engineering psychologist, for the human is generally not required to act in such a simple capacity in man-machine systems. What man does have to do, in addition to controlling, is to collect information, filter it, store it, evaluate it, and apply rules to it; in other words, he has to make decisions and to think. And for these processes there are no adequate engineering models because we do not know enough about decision making and thinking to reduce them to mathematical logic.

Someday we will have this knowledge. Whether it will be developed through psychological studies of men deciding and thinking, or as a result of a formal logical analysis of the tasks of complex systems, or through the development and use of heuristic computer programs (Reitman, 1959), cannot now be foretold. However, regardless of how it is come by, such knowledge will provide us with new insights to add to our basic four and new models which, hopefully, will be as fruitful for the design of man-machine decision complexes as the servo model now is for the synthesis of continuous control systems.

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4. What Is System Analysis? *

Paul Peach

I. Introduction. People concerned with systems analysis have not yet agreed completely on what it is. Systems analysis is too young a field to have matured any considerable body of accepted doctrine. We can agree pretty well on the WHY of systems analysis, and to some extent on the objectives; these usually look to a better understanding of a system, an evaluation in terms of some standard, or a prediction of possible inadequacies. With respect to basic approach and methodology, we must not be surprised if each worker sees the job in the light of his own experience and background. Each blind man has his own mental image of the elephant; one of these days a wider experience and deeper insight will perceive the greater structure, and each partial view will take its proper place in the whole.

A system is an aggregate of two or more physical components and a set of disciplines or procedures by means of which they function together. The units may be animate or mechanical. The men in the caves of Cro-Magnon who worked together, one holding a light while the other painted a picture on the wall, comprised a system. The argosy of Columbus was a system; so is General Motors Corporation. But modern systems differ from earlier ones in size, in complexity, in degree of mechanization, and especially in the extent of their use of automatic controls. The driver of a farm wagon in 1910 had indeed to control his system, but its design was simple, control was easy and direct, and changes of the system state were slow enough to allow him plenty of time for appraising situations and making decisions. The pilot of a rocket ship cannot expect to control it with manual operations, except in an indirect way; things happen too fast, and control is too complicated. Thus, with modern systems we encounter a whole new class of problems in control: making the system do what we want, and preventing it from doing what we don't want. In order to attack these problems (not all of them can be solved in any complete sense) we need to understand the structure of the system; what its components are, what they do, and how they work together. Studies of this kind are the job of the systems analyst.

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Definitions of the word "analysis" agree that it implies an attempt to understand the whole by studying its parts. Chemistry provides us with useful analogies. All matter is made up of atoms and molecules. But there exist many configurations of atoms that have a sort of independent identity of their own: they pass unchanged through a variety of reactions, and resist attempts to break them apart. Examples are water, ammonia, the cyanogen group CN, the SO_4 ion of sulfuric acid, and the closed chain of six carbon atoms called the benzene ring. Such configurations are important because they have special properties that cannot be inferred from a knowledge of the constituents; thus, the properties of cyanides could not be predicted from those of carbon and nitrogen, nor those of water from hydrogen and oxygen. On the other hand, knowing the properties of the CN group, we can predict at least something about sodium cyanide, potassium cyanide, hydrocyanic acid, and other compounds containing the group. In chemistry, such a configuration is called a radical; in sports, a team; in engineering, a sub-assembly or black box. We shall call it a system element.

Understanding a system element, or component, involves the following considerations:

a. We need to know the properties of the component in order to understand those of the next larger structure that includes it.

b. We do not need to look inside the component: that is, analysis of the component into its parts adds little or nothing to our understanding of the system.

For example, the chemical formula for ammonium nitrate is NH_4NO_3. We think of it as an ammonium group NH_4+ and a nitrate group $NO_3—$. For most purposes we go no further; in fact, further analysis might lead to confusion, since the two nitrogen atoms are not equivalent. Still less do we require (for most purposes) information about the protons, neutrons, and electrons that build up the atoms themselves. Again, if part of our system is an alarm clock, we shall usually need to know the properties of the clock as a unit, but not as a rule details of mainsprings, escapements, balance wheels, and gear trains. Still, situations may arise in which we have to look at the clock mechanism: for example, in choosing between an electric and a spring-driven clock. In short, system analysis operates by studying the parts of a system and how they work together; but the degree to which we carry the subdivision depends on the need. We carry it only far enough to identify the system elements, which for the purpose in hand can be treated as units.

A system, then, is a structure, more or less complicated, whose physical components are system elements, as defined earlier. The objective of system analysis is to discover or predict the properties of the system.

Now, in a sense, this is an impossible objective. For every system must operate in an environment, and systems have no "properties" in the absolute sense; they have properties only with respect to some designated environment. In systems analysis we look first for properties that will (we hope) remain more or less stable in spite of considerable changes in the environment. Such properties can often be defined by objective measurements; the number of channels in a communications system, the time required by a computer to find an entry in memory, the capacity of a container.* Second, we look for dependence relationships between the system and foreseeable changes in the environment. This kind of investigation usually leads to a statistical estimate or prediction: the probability of overload or failure, the mean detention time in a queue, the loss of information under conditions of noise. Finally we try to visualize the performance of the system under non-statistical uncertainty (for example, vulnerability to sabotage). At present, we have no mathematical approach to this kind of problem, and trials such as those made in war gaming or simulation seem to be the best we can do.

II. Kinds of System Elements. The first step in systems analysis is to recognize the *kinds* of system elements into which the system is to be decomposed. In the analysis of any communications system I suggest that we shall find the following:

a. Delay elements, whose function is to receive a signal and then to transmit the same signal after a suitable interval.

b. Amplifiers, whose function is to receive a signal and transmit it unchanged except for magnitude.

c. Converters, whose function is to receive a signal in one form and transmit it in another form (example: electrical input, speech output).

d. Carriers, whose function is to receive a signal in one place and deliver it in another.

e. Comparators, whose function is to receive a signal, compare it with another signal, and produce an output that depends on the result of the comparison.

f. Computers, whose function is to receive one or more signals, operate upon them according to a program, and deliver an output having the desired logical relation to the inputs. (A comparator is a kind of computer, but the job a comparator does is so common that it seems worth while to distinguish it.)

Each of the functions listed above can be performed by a machine or a human operator. We usually distinguish between the two, and in fact one might want to treat human operators as a separate category. By not

* But note that even these measurements may be subject to environment. How many potatoes will go into 538 cubic inches? One peck, says the incautious one. But for containers of special shapes the answer is: no potatoes at all. (Example: a long narrow tube.)

doing so, we maintain a degree of consistency in our classification by emphasizing the job rather than the job-doer. In any system analysis, the activity of human beings calls for special attention.

It is often possible to regard a subsystem either as a single system element, or as a compound of such elements. Thus, a telephone system (consisting of a wire network and associated equipment) may be regarded as a carrier, since its function is to receive a signal in one place and deliver it in another; but it may also be regarded as a compound of converters, amplifiers, carriers and computers. We select the point of view in accordance with the following principle: If the joint operation of all the subsystem components can be satisfactorily predicted on the basis of present knowledge, we treat the subsystem as a single element; otherwise not. Under peace-time conditions we might choose to treat a telephone system as a system element, since the properties of telephone systems have been widely studied and are fairly well known; this amounts to taking the whole telephone system as a black box. Under war-time conditions we might prefer to go on to a lower level of decomposition, since the carrier part (the wire network) is more exposed to enemy action and sabotage than is the associated equipment, and thus might require special consideration in the analysis.

III. The Performance of System Elements. Having defined the *kinds* of elements of which our system is composed, we come naturally to a consideration of how these elements perform, and especially of how they may fail. A human operator, for example, may fail because he is absent, tired, asleep, or dead, because he is insufficiently trained, because the stimulus is ambiguous, or because the response is inhibited (the Irishman could not be trusted to wave a red flag when there was a green one handy). From a knowledge of possible failures we should be able to design a plan of testing that will explore the weaknesses of the system element under study, and a set of measures (or at any rate qualitative statements) to show the kind of performance to be expected from the element. Measures that can be expressed in numerical form we call parameters. If the input-output relationship for a particular system element can be described by a mathematical transformation, the parameters are the constants involved, and the transformation itself is called the transfer function. Computers and human operators do not have transfer functions in the elementary sense, but we may still describe their operation, at least to a degree, in quantitative terms—say in probabilities—and think of these as parameters.

Analysis of the system itself necessarily starts with a representation of the system structure. This means we have to identify the system elements and tell how they are fitted together. For this purpose we use the device of a block diagram, an array of rectangles or "boxes" connected

by means of lines. Each box represents a system element. A line leading from one box to another means that the output of Box A becomes an input to Box B. The output of a comparator will depend on the result of the comparison, and the result, a "conditional output" is usually two-fold, corresponding to a "Yes" or "No" answer and denoted by + and —. Boxes may be of various shapes if desired (say, to indicate various functions).

Earlier we identified the system elements; the next step is to determine the input-output relationships for each element. For example, a converter may receive electrical impulses and produce a typewritten sheet as output. If it is working properly, the output should be almost simultaneous with the input, and should be an exact translation of it. If it is not working properly, it is not likely that the output will be delayed (most such devices have no memory) but it is quite likely that there will be no output at all. The other possibility is that the output may not correspond to the input: one or more letters or figures may be incorrect or missing. This could arise from a failure in the electrical system, from a sticking key, or from a break in the typewriter ribbon. We determine the input-output relationships by asking:

a. What form of input is required?
b. How fast can it be accepted?
c. What kind of output is generated, and how fast?
d. In what ways can the equipment fail?
e. What are the various failure probabilities?
f. What are the likely consequences of each type of failure?

Very often, the answers to these questions can be found only by experiment. The systems analyst then has the following tasks:

a. Decide what kinds of measurements will describe the operating characteristics of the component. (We call these measures "criteria.")
b. Decide what experiments (what kind and how many) are needed to give adequate numerical estimates of these criteria.
c. Assuming the experiments are performed, decide whether they have achieved their purpose, and how reliable the resulting estimates are.
d. If the desired experiments cannot be performed, decide on the best feasible alternative, and estimate the loss to the system analysis from this compromise.

IV. System Synthesis. Thus far we have represented the whole system as an aggregate of system elements, and determined the operating characteristics of each of the elements; we now proceed to a synthesis: we put our elements together a few at a time, reproducing parts of the total system. The simplest kind of synthesis would be one in which we construct

straight chains of elements, but though we may indeed begin with such chains, we shall eventually have to include non-linear subsystems: in particular, subsystems containing branches, confluences, and loops. Our synthesis reveals possibilities of failure that arise, not from the characteristics of the elements themselves, but from the relationships of the elements to each other in the system structure. Among these possibilities we have incompatibility (Box B cannot accept the output of Box A), bottlenecks (Box B cannot keep pace with Box A), congestion (outputs from Boxes A and B interfere with each other when they arrive at Box C), crosstalk (some of the output from Box A, intended only for Box B, escapes into Box C and causes confusion there), and instability (usually in connection with poorly designed control systems). The possibilities of failure that arise from the configuration need to be recognized; then, as with the system elements, we need to devise measures and tests that will describe for us the operational characteristics of the subsystem.

This problem of instability is peculiar to modern, large-scale systems. It arises, usually, in connection with automatic control devices or servomechanisms, involving a loop or feed-back signal. But it can be illustrated by the steering of a ship.

When a ship is controlled by a hand wheel and a magnetic compass, the steersman has to take care not to oversteer. A ship, being large, does not respond at once to the helm; and a magnetic compass, being subject to friction, does not instantly indicate the response when it occurs. A good steersman learns to anticipate the response, and steer with as little rudder as possible. If, when the ship swings to port, he ports his helm and keeps it there until the compass shows on course, the consequence will be a larger swing to starboard; after a few cycles like this, the ship will be yawing, completely out of control.

The same sort of thing can happen with automatic controls: if response and timing are not correct, the result may be a series of ever-increasing swings, called oscillations. Servo engineers learn an elaborate mathematical theory that enables them to predict the stability characteristics of many systems. It usually happens that there is a range of magnitude for the system parameters within which the system is stable, and outside of which it oscillates.

The final synthesis of the complete system from the subsystems involves no new principles. If the synthesis has been successful, it should be possible to replace each subsystem with a single box, and to combine these boxes into new subsystems until the total system has been generated. The final product should be a block diagram consisting of a single box, labeled "Solve Problem," and the input-output relationships for this all-inclusive box will describe the performance of the system as a whole.

To illustrate the application of the philosophy here presented, let us consider a sequence of operations intended to initiate an airplane flight.

The operation as a whole (system-wide) might be represented by the single box

but this is a goal rather than an operation: it states the objective, but not how the objective is attained. Initially, we might break the box up into several boxes, as in Fig. 1.

The boxes with curved ends indicate other systems with which the control tower communicates; the initial input is always from such a sys-

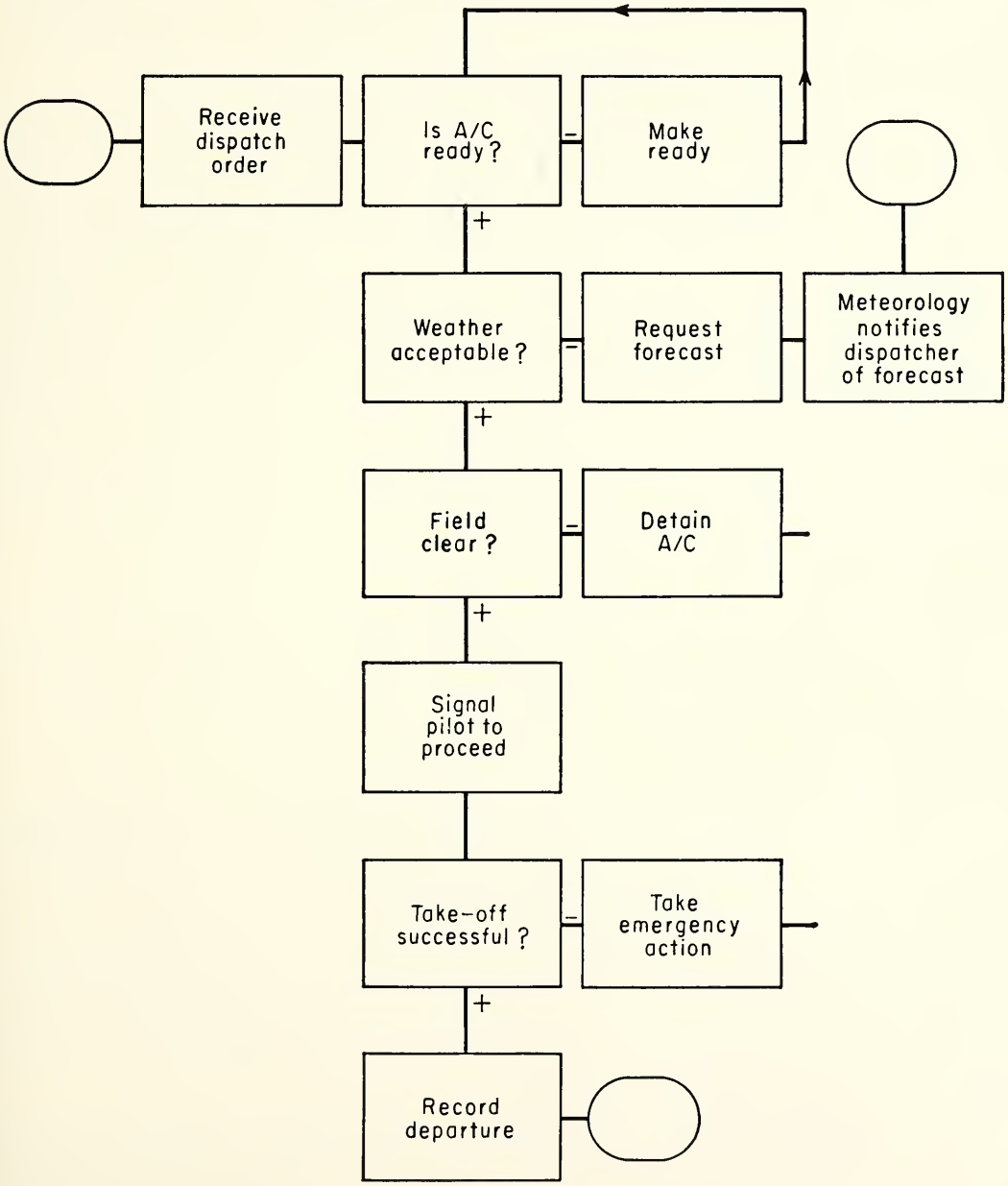
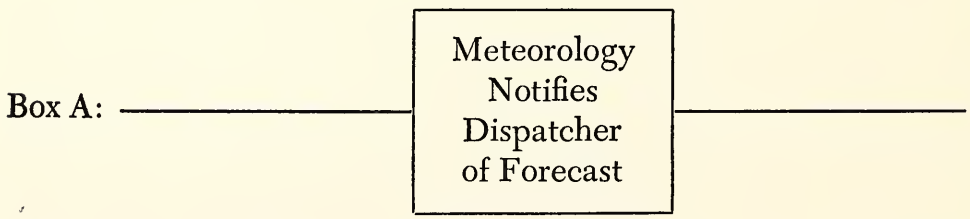


Fig. 1. A functional breakdown.

tem, the final output to one, and there may be any number of interactions along the way. Note the open end after "Meteorology Notifies Dispatcher of Forecast." The next box will have conditional outputs, but the decision itself is not shown; it might take any one of a number of forms. If the flight were a passenger flight with safety the chief consideration, the decision might be to detain the flight or cancel it and forward the passengers by bus; if it were a rescue mission, the decision might be to take off before the weather got even worse. A continuation of the diagram requires understanding the total objectives of the system. Similar remarks apply to the open ends after "Detain A/C" and "Take Emergency Action." The output from the last box, "Record Departure," takes us outside the system; at this point the control tower completes its job and another system takes over. The input to the first box, "Receive Dispatch Order," comes from outside the system.

Some of the boxes may represent system elements as they stand; for example, "Signal Pilot to Proceed" and "Is Take-off Successful?" Operationally, the "Signal Pilot" box is a carrier; it receives the equivalent of an all-clear signal in the control tower and transmits it to the pilot. But if in the process human agents are involved, it may be necessary to decompose this box into smaller ones: to look, for example, at the input or display devices that present the signal to the operator, to the whole complex of duties the operator must perform (perhaps working on several aircraft at the same time) and to the carrier and converter that receive his output in the tower and reproduce it in the cockpit.

To illustrate, let's examine in more detail the box, "Meteorology Notifies Dispatcher," which we call Box A.



Step 1. *Identify inputs and input sources, and outputs and destinations.* The inputs have three sources: the control tower, the environment of the weather station at the airport, and other weather stations. From the environment we get energy inputs to instruments; from other stations we get signals (i.e., messages). All the outputs are signals. The box acts as a computer, and the total operation is one of data processing. However, we do not know *a priori* the parameters of all the components, and so must proceed to a level of greater detail.

Step 2: *Decompose Box A into smaller Boxes* (Fig. 2 is an example).

Step 3: *Continue decomposition as in Step 2 until each box meets the criteria for a system element* (See the example in Fig. 3).

At least some of these boxes appear to represent system elements. Thermometers, anemometers and barometers are analogue computers, accepting energy inputs from the environment and delivering readings on a scale. Their operating characteristics are known with great precision; this means that we know all we need to know about the input-output relations of Boxes 11.11, 11.12, and 11.13. Of the following boxes (11.21,

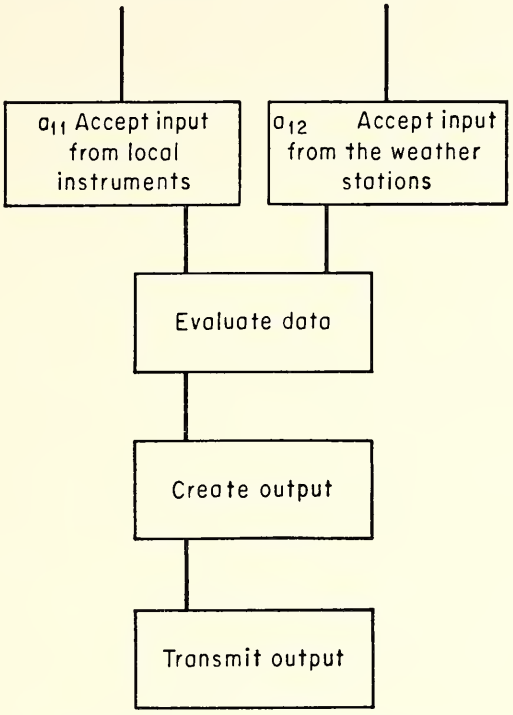


FIG. 2. Decomposition of Box **A.**

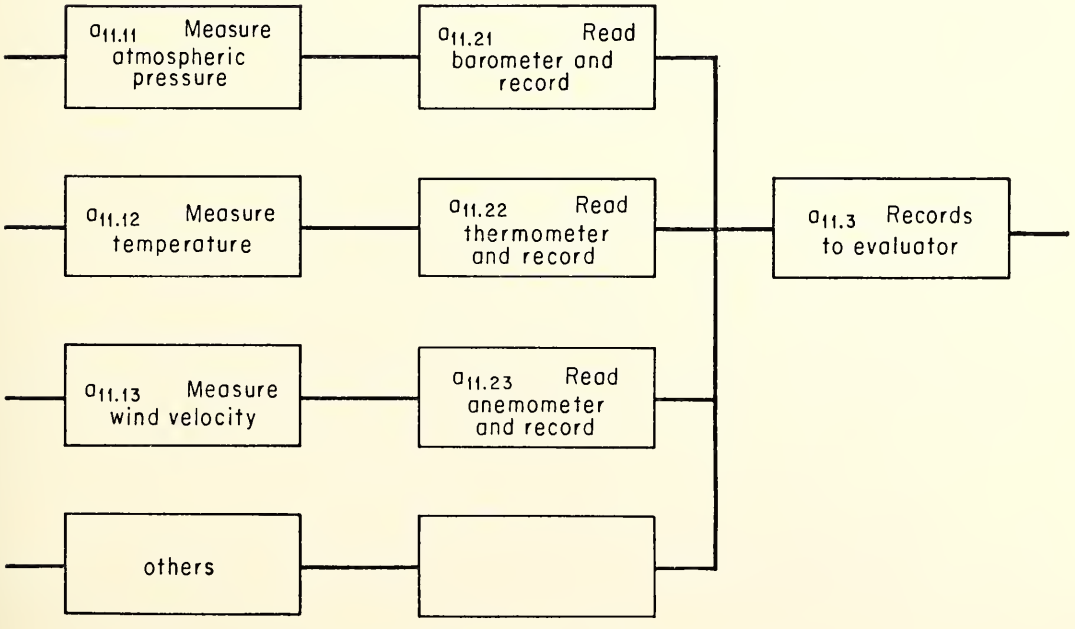


FIG. 3. Decomposition of Box a_{11}, Step 2.

11.22, and 11.23) all represent stimulus-response situations with a human observer (assuming that a human observer reads the instruments). It may or may not be true that the input-output relationships for these boxes are known, but generally the statement that a stimulus-response sequence is completely understood requires verification. Whether 11.3 is a system element can be decided only by examining the physical situation.

In determining the parameters for, say, Box 11.21 we would attempt to measure liability to failure: for example, the probability that the observer will make a mistake in reading the barometer. As a practical matter, we are forced at once into a synthesis, since our concern is not with barometers in general, but with a specific barometer. But the linear subsystem

introduces new questions: not only "Can the observer read *this* barometer?" but "Can he read this barometer at the times and under the conditions likely to arise in the performance of his work? Does the act of reading interfere with the act of recording?" If, for example, the reading has to be made out of doors, and the act of recording consists of making some marks on a piece of paper, such interference may arise (in bad weather, for example).

As we progress up the ladder of synthesis, we fit linear subsystems together. The present example leds to a confluence: several simple linear systems that feed into the same box. If 11.21, 11.22, and 11.23 involve three different operators, the inputs to 11.3 may arrive out of phase or synchronization, and so we have a traffic control problem. If (as is more likely in this case) a single operator reads all the instruments and hand carries a paper record to its destination (which may be his own desk) we have no traffic problem, but may have an increased probability of mistakes because of the more complicated task. If—and only if—we can show that the energy inputs (into 11.11, 11.12, 11.13) lead with high probability to the delivery of accurate and timely records to 11.3, we can subsume the whole confluence into a single box (a_{11} of Fig. 2) with the input-output relations fully understood. In fact, if we could have shown this in advance, the analysis of Box a_{11} would not have been necessary. It happens occasionally that we open a box, only to close it again. Work so expended is not lost—we gain from it insight and confidence.

Part Nine: INDUSTRIAL LEADERSHIP

1. An Analysis of Leadership *

Douglas M. McGregor

Are successful managers born or "made"? Does success as a manager rest on the possession of a certain core of abilities and traits, or are there many combinations of characteristics which can result in successful industrial leadership? Is managerial leadership—or its potential—a property of the individual, or is it a term for describing a relationship between people? Will the managerial job 20 years from now require the same basic abilities and personality traits as it does today?

Knowledge gained from research in the social sciences sheds light on these and other questions relevant to leadership in industry. It does not provide final, definitive answers. There is much yet to be learned. But the accumulated evidence points with high probability toward certain ones among a number of possible assumptions.

It is quite unlikely that there is a single basic pattern of abilities and personality traits characteristic of all leaders. The personality characteristics of the leader are not unimportant, but those which are essential differ considerably depending upon the circumstances. The requirements for successful political leadership are different from those for industrial management or military or educational leadership. Failure is as frequent as success in transfers of leaders from one type of social institution to another.

Even within a single institution such as industry, different circumstances require different leadership characteristics. Comparisons of successful industrial leaders in different historical periods, in different cultures, in different industries, or even in different companies have made this fairly obvious. The leadership requirements of a young, struggling company, for example, are quite different from those of a large, well-established firm.

Within the individual company different functions (sales, finance, pro-

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duction) demand rather different abilities and skills of leadership. Managers who are successful in one function are sometimes, but by no means always, successful in another. The same is true of leadership at different organizational levels. Every successful foreman would not make a successful president (or vice versa). Yet each may be an effective leader.

On the other hand, leaders who differ notably in abilities and traits are sometimes equally successful when they succeed each other in a given situation. Within rather wide limits, weaknesses in certain characteristics can be compensated by strength in others. This is particularly evident in partnerships and executive teams in which leadership functions are, in fact, shared. The very idea of the team implies different and supplementary patterns of abilities among the members.

Many characteristics which have been alleged to be essential to the leader turn out not to differentiate the successful leader from the unsuccessful ones. In fact, some of these—integrity, ambition, judgment, for example—are to be found not merely in the leader, but in any successful member of an organization.

Leadership Is a Relationship. There are at least four major variables now known to be involved in leadership: (1) the characteristics of the leader; (2) the attitudes, needs, and other personal characteristics of the followers; (3) characteristics of the organization, such as its purpose, its structure, the nature of the tasks to be performed; and (4) the social, economic, and political milieu. The personal characteristics required for effective performance as a leader vary, depending on the other factors.

This is an important research finding. It means that leadership is not a property of the individual, but a complex relationship among these variables. The old argument over whether the leader makes history or history makes the leader is resolved by this conception. Both assertions are true within limits.

The relationship between the leader and the situation is essentially circular. Organization structure and policy, for example, are established by top management. Once established, they set limits on the leadership patterns which will be acceptable within the company. However, influences from above (a change in top management with an accompanying change in philosophy), from below (following recognition of a union and adjustment to collective bargaining, for example), or from outside (social legislation, changes in the market, etc.) bring about changes in these organizational characteristics. Some of these may lead to a redefinition of acceptable leadership patterns. The changes which occurred in the leadership of the Ford Motor Company after Henry Ford I retired provide a dramatic illustration.

The same is true of the influence of the broader milieu, The social values, the economic and political conditions, the general standard of living, the level of education of the population, and other factors char-

acteristic of the late 1800's had much to do with the kinds of people who were successful as industrial leaders during that era. Those men in turn helped to shape the nature of the industrial environment. Their influence affected the character of our society profoundly.

Today, industry requires a very different type of industrial leader than it did in 1900. Similarly, today's leaders are helping to shape industrial organizations which tomorrow will require people quite different from themselves.

Conformity Is Rewarded. An important point with respect to these situational influences on leadership is that they operate selectively—in subtle and unnoticed as well as in obvious ways—to reward conformity with acceptable patterns of behavior and to punish deviance from these. The differing situations from company to company, and from unit to unit within a company, each have their selective consequences. The observable managerial "types" in certain companies are illustrative of this phenomenon. One consequence of this selectivity is the tendency to "weed out" deviant individuals, some of whom might nevertheless become effective, perhaps outstanding, leaders.

Even if there is no single universal pattern of characteristics of the leader, it is conceivable at least that there might be certain universal characteristics *of the relationship* between the leader and the other situational factors which are essential for optimum organized human effort in all situations. This is doubtful. Consider, for example, the relationship of an industrial manager with a group of native employees in an underdeveloped country on the one hand, and with a group of United States workmen who are members of a well-established international union on the other. Moreover, even if research finally indicates that there are such universal requirements of the relationship, there will still be more than one way of achieving them. For example, if "mutual confidence" between the leader and the led is a universal requirement, it is obvious that there are many ways of developing and maintaining this confidence.

It does not follow from these considerations that any individual can become a successful leader in a given situation. It does follow that successful leadership is not dependent on the possession of a single universal pattern of inborn traits and abilities. It seems likely that leadership potential (considering the tremendous variety of situations for which leadership is required) is broadly rather than narrowly distributed in the population.

Research findings to date suggest that it is more fruitful to consider leadership as a relationship between the leader and the situation than as a universal pattern of characteristics possessed by certain people. The differences in requirements for successful leadership in different situations are more striking than the similarities. Moreover, research studies emphasize the importance of leadership skills and attitudes which can be

acquired and are, therefore, not inborn characteristics of the individual.

It has often happened in the physical sciences that what was once believed to be an inherent property of objects—gravity, for example, or electrical "magnetism," or mass—has turned out to be a complex relationship between internal and external factors. The same thing happens in the social sciences, and leadership is but one example.

Implications for Management. What is the practical relevance for management of these findings of social science research in the field of leadership? First, if we accept the point of view that leadership consists of a relationship between the leader, his followers, the organization, and the social milieu, and if we recognize that these situational factors are subject to substantial changes with time, we must recognize that we cannot predict the personal characteristics of the managerial resources that an organization will require a decade or two hence. Even if we can list the positions to be filled, we cannot define very adequately the essential characteristics of the people who will be needed in those situations at that time. One of management's major tasks, therefore, is to provide a heterogeneous supply of human resources from which individuals can be selected to fill a variety of specific but unpredictable needs.

This is a blow to those who have hoped that the outcome of research would be to provide them with methods by which they could select today the top management of tomorrow. It is a boon to those who have feared the consequences of the "crown prince" approach to management development. It carries other practical implications of some importance.

With the modern emphasis on career employment and promotion from within, management must pay more than casual attention to its recruitment practices. It would seem logical that this process should tap a variety of sources: liberal arts as well as technical graduates, small colleges as well as big universities, institutions in different geographic regions, etc. It may be necessary, moreover, to look carefully at the criteria for selection of college recruits if heterogeneity is a goal. The college senior who graduates in the top 10 per cent of his class may come from a narrow segment of the range of potential leaders for industry. What of the student who has, perhaps for reasons unrelated to intellectual capacity, graduated in the middle of his class because he got A's in some subjects and C's and D's in others? What of the student whose academic achievement was only average because the education system never really challenged him?

As a matter of fact there is not much evidence that high academic achievement represents a necessary characteristic for industrial leadership. There may be a positive correlation, but it is not large enough to provide a basis for a recruitment policy. In fact, the current President of the United States would have been passed over at graduation by any management recruiter who relied on this correlation! It may be, on the contrary, that the *intellectual* capacity required for effective leadership in

many industrial management positions is no greater than that required for graduation from a good college. Of course, there are positions requiring high intellectual capacity, but it does not follow that there is a one-to-one correlation between this characteristic and success as an industrial leader. (This question of intellectual capacity is, of course, only one reason why industry seeks the bulk of its potential management resources among college graduates today. There are other factors involved: confidence and social poise, skill acquired through participation in extracurricular activities, personal ambition and drive, etc. These, however, are relatively independent of class standing.)

It may be argued that intellectual *achievement,* as measured by consistently high grades in all subjects, is evidence of motivation and willingness to work. Perhaps it is—in the academic setting—but it is also evidence of willingness to conform to the quite arbitrary demands of the educational system. There is little reason for assuming that high motivation and hard work in school are the best predictors of motivation and effort in later life. There are a good many examples to the contrary.

Development Program Requirements. A second implication from research findings about leadership is that a management development program should involve many people within the organization rather than a select few. The fact that some companies have been reasonably successful in developing a selected small group of managerial trainees may well be an artifact—an example of the operation of the "self-fulfilling prophecy." If these companies had been equally concerned to develop managerial talent within a much broader sample, they might have accomplished this purpose with no greater percentage of failures. And, if the generalizations above are sound, they would have had a richer, more valuable pool of leadership resources to draw on as a result.

Third, management should have as a goal the development of the unique capacities and potentialities of each individual rather than common objectives for all participants. This is a purpose which is honored on paper much more than in practice. It is difficult to achieve, particularly in the big company, but if we want heterogeneous leadership resources to meet the unpredictable needs of the future we certainly won't get them by subjecting all our managerial trainees to the same treatment.

Moreover, this process of developing heterogeneous resources must be continuous; it is never completed. Few human beings ever realize all of their potentialities for growth, even though some may reach a practical limit with respect to certain capacities. Each individual is unique, and it is this uniqueness we will constantly encourage and nourish if we are truly concerned to develop leaders for the industry of tomorrow.

Fourth, the promotion policies of the company should be so administered that these heterogeneous resources are actually considered when openings occur. There is little value in developing a wide range of talent

if only a small and possibly limited segment of it constitutes the field of candidates when a particular position is being filled.

In view of the selective operation of situational variables referred to above, there may be legitimate questions concerning the value of an *exclusive* policy of "promotion from within." It is conceivable that in a large and reasonably decentralized company sufficient heterogeneity can be maintained by transfers of managerial talent between divisions, but it is probable that fairly strenuous efforts will be required to offset the normal tendency to create and maintain a "type," a homogeneous pattern of leadership within a given organization. Without such efforts competent individuals who don't "fit the pattern" are likely to be passed over or to leave because their talents are not rewarded. Many industrial organizations, for example, would not easily tolerate the strong individualism of a young Charles Kettering today.

People Come First. Finally, if leadership is a function—a complex relation between leader and situation—we ought to be clear that every promising recruit is *not* a potential member of top management. Some people in some companies will become outstanding leaders as foremen, or as plant superintendents, or as professional specialists. Many of these would not be effective leaders in top management positions, at least under the circumstances prevailing in the company.

If we take seriously the implications of the research findings in this field, we will place high value on such people. We will seek to enable them to develop to the fullest their potentialities in the role they can fill best. And we will find ways to reward them which will persuade them that we consider outstanding leadership at any level to be a precious thing.

2. Leadership within a Hierarchical Organization *

Donald C. Pelz

Introduction. Concern with leadership has been central to behavioral science studies from the beginning. But there have been important shifts in emphasis. Our early concepts and hypotheses draw freely from previous studies on small groups. To discover how the first-line supervisor affected employee attitudes and productivity, the direction of search

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seemed obvious. One studied the face-to-face interactions between supervisor and work group.

The hard facts of analysis have shown that this approach is incomplete. Leadership in isolated groups is one thing; leadership within large organizations may be something else again. At least, it must be looked at with a fresh view.

The impact of organizational factors on interactions within the work group was suggested by some of our first results. In training courses the supervisor is given this general rule: he should always recognize good work done by employees. He should, for example, recommend deserving employees for promotion. But in the insurance company study, supervisors of high producing work groups were found to play one of two roles in the promotion process. Either they made recommendations which generally went through, or they made no recommendations at all. In contrast, the supervisors of low producing work groups often recommended promotions, but these generally did not go through.[1] To recommend promotions was not, as such, related to high employee productivity. A more basic factor seemed to be operating, outside the sphere of the work group. This factor was the supervisor's power within the larger department. The high producing supervisors were more realistic about their power; they entered the promotion process only when they could influence the outcome. The concept of the supervisor's power or influence within his department is central in a recent study, some details of which are given below.[2]

Superficially the results of such studies might suggest that we need one set of theories to account for leadership in isolated groups, and another set of theories to account for leadership within hierarchical organizations. It is our belief, however, that both situations can be incorporated within a single theoretical framework. In fact, it might be possible to use artificial groups and laboratory methods to reproduce some of the variables of organizational context. Variables such as power and status have been manipulated in several studies done at the Research Center for Group Dynamics.[3] Some elements in a theoretical framework designed to include both leadership situations are discussed at this point.

Basic Postulate: Successful Leadership Depends in Part on Helping Group Members Achieve Their Goals. Empirical studies, as shown in re-

[1] D. Katz, N. Maccoby, and N. C. Morse, *Productivity, Supervision and Employee Morale, Part I.* Ann Arbor: Survey Research Center, Univ. of Michigan, 1950.

[2] D. C. Pelz, *Power and Leadership in the First-line Supervisor* (preliminary draft), 1951. Ann Arbor: Survey Research Center, University of Michigan.

[3] Cf. H. H. Kelley, "Communication in Experimentally Created Hierarchies," *Human Relations,* 1951, **4**, 39–56; A. Pepitone, "Motivational Effects in Social Perception," *Human Relations,* 1950, **3**, 57–76.

views of the literature by Gibb,[4] Jenkins,[5] and Stogdill,[6] have failed to find traits that are universal in successful leaders. In different studies, different or contradictory traits in leaders are found related to whatever criterion of success is used. Differences in the situations or in the groups, from study to study, seem to be partly responsible. Gibb concludes that "leadership is relative always to the situation."

But it is not enough simply to say the leadership is relative to the situation. Relative to what aspects of the situation? We must identify those factors which make a given leader behavior "successful" or "unsuccessful."

Recent theories have stressed the *needs of group members* as key aspects of the all-important "situation." The successful or valued or obeyed leader is one who can help group members achieve their goals. This emphasis on group members' needs and goals appears sound, at least as one beginning of a theory of leadership. In any kind of situation, a basic postulate is that *the more the leader (or any member) helps other members achieve their goals, the greater will be the members' acceptance of him.* By "acceptance" is meant that members are willing to follow the leader's suggestions, express satisfaction with the leader's conduct, etc.

This basic postulate is not, by itself, a theory. It does not permit us to make specific predictions, and this a genuine theory must be able to do. To make predictions, we must be able to state conditions such as: (*a*) Toward what goals are the group members motivated? (*b*) What acts or characteristics of a leader help the members achieve each of these goals? And finally, (*c*) How do specific leaders measure up on these factors? If the first two conditions are known, and if we have measured each leader on the relevant factors, we can begin to predict the acceptance of particular leaders by their particular groups.

Very probably, the basic postulate will apply to leaders within a hierarchical organization, as well as to leaders in simpler groups. But the conditions which we need to know for prediction may be markedly affected by the organizational context. With regard to (*a*), for example, we shall have to give more weight to what we may loosely call "organizational goals" and "group goals." These must, of course, actually function as goals or as sub-goals for the individual members, if the basic postulate is to apply. With regard to (*b*), the organizational context will have much to do with whether certain acts of the leader can or cannot help his group

[4] C. A. Gibb, "The Principles and Traits of Leadership," *Journal of Abnormal and Social Psychology,* 1947, **42,** 267–284.

[5] W. O. Jenkins, "A Review of Leadership Studies with Particular Reference to Military Problems," *Psychological Bulletin,* 1947, **44,** 54–79.

[6] R. M. Stogdill, "Personal Factors Associated with Leadership: A Survey of the Literature," *Journal of Psychology,* 1948, **25,** 35–71.

members achieve their goals. The recent study cited above underscores this point. Major features of this research will now be described.

The Point of Departure: Some Puzzling Results in Previous Analyses of the Data. The data for the study were collected early in 1948 from the personnel of a large electric utility, employing well over 10,000 people, and serving a major midwestern manufacturing city and surrounding urban and rural areas. The work of the company covers many different occupations and skill levels. Attitudes of all non-supervisory employees were ascertained through paper-and-pencil questionnaires. Attitudes and practices of all first-line supervisors—each of the people in charge of a work group, the basic unit—were obtained in personal interviews utilizing open-ended questions. The verbatim replies were later coded with the content analysis procedures of the Survey Research Center.

The author's objective was to determine how measures obtained on the supervisors related to attitudes of employees they supervised. What supervisory practices led to employee acceptance of the supervisor? Three separate analyses had to be done, before answers to this question could be formulated. In the process, the importance of organizational factors became increasingly clear.

The first analysis was a design frequently found in leadership studies. Forty "high employee satisfaction" work groups and thirty "low employee satisfaction" work groups were selected, and the data from their respective supervisors examined on fifty items. While half the differences were in the expected direction, only six differences were statistically significant (at the five percent level of confidence). By chance alone, 2.5 "significant" differences would be expected; the obtained number was little more than twice the chance number.

The inconclusiveness of these results compelled a second analysis. The previous analysis had focused exclusively on the interaction between supervisor and employees in the work group; it had assumed, in all work groups, universal relationships between supervisory practices and employee attitudes. But the evidence on situational effects warns against this assumption. High satisfaction in one group of employees may result from supervisory practices quite different from those used in another well satisfied group. In the second analysis, therefore, different types of employees and situations were handled separately. Separate analyses were performed for men and women, for white collar and blue collar workers, for small work groups and large, for differing educational backgrounds, and for various combinations of these factors.

The results of this analysis were more promising. A direct comparison with the first is not possible—different measures of the supervisory and employee variables were used. It is interesting that statistically significant results numbered seven times chance. But some of these significant re-

sults were disturbing; some went *opposite* to predictions based on previous research. One of the supervisory measures, for example, was a scale of "taking sides with employees in cases of employee-management conflicts," based on three intercorrelated items from the interview. In case of disagreement between the employees under him and his own superiors, whose side did the supervisor take? Did he see his job primarily as selling his employees' viewpoint to management, as selling management's viewpoint to employees, or as remaining independent? Previous evidence suggests that group members will think more highly of the leader who "goes to bat" for them, who sides with them in cases of conflict with higher authorities. The results supported this hypothesis in small work groups (10 employees or fewer). But in large white collar work groups, employees were significantly *less* satisfied with such a supervisor; they preferred the supervisor who sided with management. Other supervisory variables showed similar contradictory results.

Why? What was there about the large work group situation that produced relationships apparently opposite to those found in small work groups? Still one more analysis was essential, if we were to resolve this predictive tangle and others like it.

The previous section mentions two general areas within which the third analysis design sought some of the responsible factors. Perhaps employees in the larger work groups had different needs and goals from those in the smaller groups. One step, therefore, was to develop, from existing employee data, crude indices of certain needs.

Or perhaps the same supervisory behavior, in small and in large work groups, might have different results with respect to employees' achieving their goals. At this point, the factor of the supervisor's *power or influence* within the larger department became crucial.

Two Predictions on Influence and Leadership. The type of theory adopted for the third analysis has already been described. The basic postulate is that the supervisor will be "accepted" by his work group if his behavior helps them to achieve their goals. The new concept introduced in the third analysis is that of the supervisor's influence within his department. If the supervisor has considerable influence over events within his department, then his attempts to help employees reach their goals are very likely to succeed. If, on the other hand, he lacks influence, then his attempts toward employee goal achievement are likely to fail.

Two related predictions follow. Given supervisors who are influential, the more they behave so as to aid goal achievement, the more satisfied their employees will be toward them. A positive correlation is predicted between the supervisory behavior and employee attitudes. But given noninfluential supervisors, there can be no such relationship. Stronger attempts toward helping employees can produce no rise in employee satis-

faction. There might be a drop, in fact. The second prediction, then, is that the correlation between the supervisor's helpful behavior and employee attitudes will be significantly less positive (or more negative) under non-influential supervisors.

If variation in influence does produce these changes in the relationships of supervisory behavior to employee attitudes, then influence may be called a "conditioner" of the relationships, following a useful suggestion by Morris and Seeman.[7] The amount of change—the difference in correlations found under high and low influence supervisors respectively —may be called the "conditioner effect" of influence.

Because of the initial emphasis on the supervisor's interpersonal relations, a variable of his power or influence was not anticipated when the data were collected. But it appeared possible to construct one. A supervisor was considered to have relatively high "influence over the social environment in which his employees were functioning" if he reported having a voice in departmental decisions made by his own superior; if he had relatively little contact with his superior—an indication of more autonomy in running his own work group; and if he had a high salary —indicating higher general status.

Two scales of supervisory behavior appeared to measure "attempts at helping employees to reach their goals." One was the scale previously described, of "taking sides with employees in cases of employee-management conflict." Another was a scale of "social closeness toward employees," or lack of social distance, based on several items from the supervisor's interview.

Several employee attitudes were used. The most important one was an index of employees' "general satisfaction with the performance of their immediate supervisor." Product-moment correlations between the two supervisory behaviors and the various employee attitudes were computed. These correlations were obtained separately under influential and under non-influential supervisors, in each of seven employee sub-populations, defined according to white collar vs. blue collar occupations, sex, size of work group, and union coverage.

Major Results. The results, in general, confirm the predictions. For the group of high influence supervisors, we obtained twenty-eight correlations between the two supervisory behaviors and the various employee attitudes in the several employee sub-populations. For the low influence supervisors, we obtained a parallel set of twenty-eight correlations. Nineteen of the correlations under influential supervisors are at least mildly positive, and seven are significantly positive (at the five percent level of confidence). This is eleven times the chance number (taking direction

[7] R. T. Morris and M. Seeman, "The Problem of Leadership: An Interdisciplinary Approach," *American Journal of Sociology*, 1950, **56**, 149–155.

into account). The first prediction is thus generally confirmed. By contrast, under low influence supervisors, nineteen of the parallel correlations are either zero or slightly negative.

The second prediction concerns the various "conditioner effects" of the supervisor's influence: the difference in each product-moment correlation between a supervisory behavior and an employee attitude, under high and low influence supervisors respectively. Positive differences are found in the majority of the twenty-eight comparisons, and six of them are significantly positive.[8] This number is ten times what chance alone would produce. Thus the second prediction is generally confirmed. It should be noted that none of these conditioner effects could have been foreseen on the basis of previous findings. They are not the product of empirical hindsight.

The results demonstrate, in short, that a supervisor's influence or power within the department does condition the way his supervisory behavior relates to employee attitudes. When an influential supervisor uses these helpful practices, positive correlations are found between his behavior and employee attitudes. But in the case of non-influential supervisors, no correlations (or slightly negative ones) are found between the same supervisory behaviors and employee attitudes.

Implications. In the three successive analyses of our supervisory leadership data, the importance of the organizational context has become increasingly clear. The major variable in the third analysis—the supervisor's power or influence within the department—depends on the supervisor's role within the larger organization. It cannot be measured by observing interactions within the work group. (The power of the supervisor over his group members is not the same variable.)

The findings imply that if an influential supervisor attempts to help employees achieve their goals, his efforts will usually succeed. Concrete results will be achieved. Employee satisfactions will rise. But—the data imply—if a non-influential supervisor tries to do the same, his efforts will often fail. Employee expectations will be frustrated. Their satisfactions will not rise, or may even fall.

From a broader view, the data illustrate the futility of studying supervisor-employee relations without regard for the organizational setting. We cannot give all supervisors a set of universal rules on how to behave toward subordinates.

This statement does not imply a pluralism in the laws of leadership. On the contrary, we believe that a variety of leadership phenomena might be accounted for in a single theoretical framework. A basic postulate in such a framework—one expressed by several theorists—is that a leader

[8] The significance of differences between correlations was tested by the use of Fisher's z-transformation for r, as described in Q. McNemar, *Psychological Statistics*. New York: John Wiley and Sons, 1950.

will be accepted by group members to the extent that he helps them to achieve their goals.

This postulate should apply both to isolated groups and to groups in an organizational setting. Specific goals will differ somewhat in the two cases. In the latter, members will emphasize organizational and group goals more than in the former. Moreover, within large organizations the leader's ability to help the group will depend to a much greater degree upon factors outside the face-to-face group. As the leader's role in the organization varies, our theory leads us to predict sharp changes in the effect of his behavior upon members' goal achievements, and hence upon their attitudes.

3. Managerial Leadership through Motivation by Objectives *

David A. Emery

The main purpose of this paper is to outline an approach to managerial leadership that provides effective and practical means for fulfilling both the work objectives of a business (or business department) and the relevant personal values of individuals in the organization. Once the theory has been set forth, some of its implications for certain current issues in the field of managerial methods and corporate responsibility will be considered.

Elements of the Theory. A brief explanation of certain assumptions should be helpful in understanding the central hypothesis:

Assumption 1: *The values that people see in work are primary factors in their motivation to work and their attitudes toward the entire work* situation (9, pp. 35–63). These values exist at both conscious and unconscious levels in the individual, and can be observed by both direct and indirect means. Surveys and depth interviews (7, 18, 19) have repeatedly identified the following items as primary values seen in work: security, achievement, contribution, sense of belonging, etc. Values of this type are assumed to be relatively durable in most people, frequently persisting for months, and even years. Work is assumed to be a fundamental, but not the only channel for fulfilling such values.

* Reprinted from *Personnel Psychology*, 1959, **12**, 65–79, by permission of the author and of Personnel Psychology, Inc.

Assumption 2: *These work values are dynamic in the sense that their relative importance may shift from time to time in any one individual. Also, these values are unlikely to be identical between different individuals or groups.* This assumption has an important bearing upon the leadership methods recommended later in this paper. At this point, let us simply note that such "internal" dynamics as psychological satiation (8) and maturation (15) and "external" factors like increased difficulty of the task or new opportunities can cause major shifts in the relative importance of work values within an individual. In work groups, such shifts as a new leader or a change in group standards can have immediate impact upon values the group induces upon its members (14).

Assumption 3: *Most people in our culture are more ready to accept and follow their own decisions than the recommendations of others.* While it is recognized that tremendous individual differences exist along this dimension, it is believed that most Americans place a high value on "freedom" or self-determination, and want to see themselves as primary factors in the decisions upon which they take action. This observation does *not* conflict with the common tendency to hold *others* responsible if the results of the action seem unfavorable (5).

Assumption 4: *Every business organization and component* [1] *of a business organization has one or more explicit or implicit objectives.* Some phrase their objectives in terms of providing goods or services, and to equitably distribute the benefits derived from this activity among members of the organization. Others simply focus directly on maximization of profit, or they may include other purposes such as improved product and service, better relations with dealers and suppliers, better internal working climate, more effective cooperation with other components of the business, etc. Organizational objectives tend to be fairly general for the company as a whole and more specific for the components within a company.

Assumption 5: *Like personal work values, these organizational objectives are dynamic.* They may change in content or relative importance as a result of internal factors such as change in product line or personnel, or external factors such as changes in the market or competition (10, pp. 429–432).

Assumption 6: *In business organizations as they are usually structured today, the manager of an organizational component is held responsible for the objectives of that component and for the integration of those objectives with the objectives of the company as a whole* (10). While this assumption is essentially a statement of prevailing practice in organization structuring, it needs emphasis because this particular managerial respon-

[1] "Component" as used throughout this paper refers to any organization unit that consists of employees reporting to a full-time manager. This could be an entire company, or a division, department, section, etc.

sibility sets a critical limit on the methods that can safely be used in order to stimulate man's motivation through component objectives.

The Theory. The central hypothesis offered here is that regardless of organization level or type of work, *men will work hardest, gain most personal satisfaction, and contribute most to the organization as a whole if they regard "contributing to the work objectives of the component" as the best available means to fulfilling their own work values now and in the foreseeable future. In this frame of mind people are more likely to be motivated toward high productivity, creativity, and self-discipline by forces from within themselves, instead of just meeting the minimum required by "external" pressures.*

Put negatively, the theory postulates that if some alternative route *other* than contributing to the objectives of the man's present component begins to look like a *better* means of fulfilling his work values ("better" meaning easier, quicker, surer to be effective, or more challenging—whatever is more appealing to the individual in question) then that is the moment when his productivity begins to fall below potential. This is because the present work will at least have lost some of his attention, and probably also some of its apparent value.

(Parenthetically, let us be sure to acknowledge that the positive statement above represents a theoretical ideal, and that any attempt to apply it in real life must take into account the tremendous range of individual differences in potential to respond to even the most promising and stimulating work situation with "maximum productivity, creativity, and self-discipline." Therefore, in the following attempt to develop practical managerial methods for creating the kind of work situation and psychological "climate" that will stimulate motivation from within, it is being continually assumed that some individuals are unlikely to respond at all, some would proceed under their own power even under highly "unfavorable" managerial approaches, but *the majority will be affected to a significant degree by their manager's approach.*)

Implications for Managerial Leadership. There are many things a manager can do to help build this "means-end" compatibility between component work objectives and the work values of individuals and groups reporting to him. Some of these steps are outlined below. Before proceeding to specifics, however, it seems appropriate to point out that all of these detailed methods have something in common which may be regarded as adding up to a particular approach to managing.

The central theme of this managerial approach is to *expand the role of non-managers through increased participation in decision-making and greater sense of personal responsibility by methods that will increase component productivity and yet preserve the managerial control needed to integrate the work of the component with the work of other components in the organization.* This is not a new theme, but neither is it one that has

been mastered. The challenge to "stimulate more participation" and "delegate more" has too often resulted in time-consuming meetings and loss of managerial control. This situation, in turn, has frequently been followed by a swing back to heavy-handed, fly-specking authoritarianism.

The methods of managerial leadership described below are believed to offer a solution to the "too tough-too soft" dilemma by indicating how people's participation and sense of personal responsibility can be increased *without* loss of managerial control.

A. Participation in Setting Objectives. Establishing objectives—the initial phase of any planning process—can be accomplished in two ways:

1. The manager can think the matter through by himself and announce his conclusions and the reasoning behind them to his subordinates.

2. The manager can solicit his subordinates' individual or group recommendations (or both) on the grounds that their ideas are likely to be helpful to him in fulfilling his responsibility for having a set of explicit component objectives (1, pp. 85–87).

The second approach is strongly recommended for several reasons:

a. Consciously or unconsciously, people are sure to project their own work values into the recommendations they develop for work objectives of their component. For example, the man who places high value on creativity in himself is almost certain to stress technological leadership and innovation as important component objectives. On the other hand, the man who is more concerned with security is likely to stress objectives such as increased share of the market and profit margin. As a result of the inevitable operation of psychological projection (6, 17), any manager who wishes can gain considerable insight into the personal work values of his people by seeking their recommendations on component long- and short-range work objectives.

However, managerial insight into subordinates' work values is not considered the primary purpose of soliciting recommendations on component objectives in this case. The main purpose is to *produce a set of component work objectives which offer the maximum opportunity for realization of subordinates' work values possible within the limits of the charter and responsibilities of the component as a whole.*

And since both the responsibilities of the component as a whole, and the work values of the individuals in it are always subject to change, *participation in developing component objectives should be a continuing —not a "one-shot"—process.* (See Assumption 2.)

b. The second reason for recommending a "participation" approach to developing component objectives is that people are much more likely to understand and support ideas they helped formulate. There is considerable empirical work to support this proposition (3, 12, 13).

One point needs to be clarified: the concept of "participation" has been

widely used to refer to a variety of group processes ranging from submitting recommendations to group decisions requiring a unanimous vote. For present purposes, "participation" means submitting recommendations individually and/or in groups with discussion of these recommendations between the manager and his subordinates either individually or in groups *but with final decision as to which recommendations will become formal work objectives of the component reserved for the manager alone.* This approach is taken because it is believed that a component manager cannot delegate his responsibility for component objectives. It is also believed that most subordinates do not expect or wish him to do so.

c. A third reason for recommending participation in developing component work objectives is that this approach is likely to produce a better set of objectives. "Better" in this case can mean more appropriate to the facilities and personnel, more complete, and even more challenging. "Better" can also mean fuller utilization of available technology. This is increasingly important in our era of accelerating technological complexity. In more and more situations it is becoming impossible for the manager to be a leader in all technological areas represented among his subordinates, or even to keep abreast of all developments in his own field of specialization (other than managing).

A word of caution should be added at this point: It has been found that groups can become so involved in setting challenging objectives and standards for themselves that they recommend unrealistically high goals. If such recommendations are allowed to become established standards, group members may react to their negative results with rejection of formal or informal leaders, or even each other (22).

d. Finally, chances of achieving mutual understanding and effective teamwork are increased if participation *begins* at the point of establishing or reviewing *objectives,* rather than improving methods, measures, or other work elements. This doesn't mean to say that participation should be avoided in these other phases of work (the balance of this paper recommends participation by subordinates in organizing work and appraisal). The point here is that participation should begin with objectives because—

. . . people frequently agree on *objectives* even when they differ widely on *methods,* and the feelings of compatibility that grow out of agreement on fundamentals provide an excellent framework for exploring differences on specifics;

. . . apparent agreement on methods is bound to be short-lived if there are unexplored differences as to basic objectives.

These points have special impact at organizational levels where cooperation between different *functions* (e.g., manufacturing, engineering, marketing, etc.) is required. If *functional* managers have participated in

establishing over-all department objectives, the objectives are more likely to take into account—and to stimulate—optimum contributions from the various functions.

B. Organizing for Individual Achievement and Teamwork. Participation in planning and setting objectives can contribute greatly to subordinates' readiness to work productively. But whether such good intentions result in greater contributions, no change at all, or serious frustration depends upon more than the planning process. Perhaps the most critical other factor is the way in which the work for which the component is responsible is divided and structured among individuals and groups (4).

It is beyond the scope of this paper (and the present ability of its author) to set forth anything like an adequate guide for structuring work in organization components. All that is attempted here is to list a few criteria that seem relevant if individual productivity and teamwork are to operate at a high level:

1. The work of the component must be divided into "man-sized" portions in the sense that real contribution is possible for the individual doing the work.

2. While these pieces of work must be "doable," they should also be sufficiently difficult for the worker to feel challenged as he approaches the work and have a sense of achievement when he completes it.

3. The units of work must be measurable and appropriate standards must be set. These measures and standards should be understood and applicable by *both* the worker and his manager.

4. The portions of work structured for individuals should also be structured to permit a *balance of individual work and teamwork.* Available data (18, pp. 379–550) indicates that people need *both:* individual achievement and a share in group productivity.

Fulfilling this last criterion is probably the most difficult task any manager faces in organizing the work of his component—particularly since the nature of the work itself often places limits on the way it can be structured. Here again, however, the manager can be greatly helped if he encourages participation (through review and recommendations) from his subordinates. None of these four criteria will ever be perfectly satisfied, but subordinates' sharing in managerial efforts toward improvement will usually work wonders with their own frustration tolerance.

C. Appraisal plus Self-appraisal. Our third criterion for structuring work specified that whatever measures are developed should be *applicable by the worker himself* as well as his manager. This is believed to be important because—

... component work objectives, whether "handed down" or developed through participation, are of little value unless measures are available to permit evaluation of progress toward the objectives;

. . . the whole process of building subordinates' awareness of participation and increased responsibility is likely to be undermined unless the subordinate not only helps formulate the work objectives, but has a real and significant role in measuring progress toward those objectives.

This last point is *not* meant to exclude managers from work appraisal. The proposal here is that just as *both* manager and man have responsibilities for, and should participate in the processes of *planning and organizing,* so do they both have responsibilities for, and should participate in *work appraisal.* One increasingly common device for accomplishing this is to have the manager and the man whose work is being evaluated each make their independent appraisal and then review their observations together. Again, since the manager is ultimately responsible, it is *his* final synthesis that must constitute the basis for decisions on pay, promotion, etc.

D. Managerial Investments for Growth. This somewhat ambiguous heading is intended to take us back to the primary purposes behind the managerial approach suggested here, and to bring out two additional recommendations for day-to-day managerial leadership.

Up to this point, the main gains promised in return for applying this admittedly complex approach to planning, organizing, and appraising has been *greater productivity* and *more favorable attitudes* among subordinates toward their manager, the organization as a whole, and each other. There is, however, another possible gain that has been receiving more and more attention in modern business and industrial organizations: *accelerated development of personnel* including those with managerial potential.

It is believed that expanding the subordinate's role along the lines indicated above will provide the strongest possible stimulant and optimum climate for personal growth. It is also believed that participation in managerial decisions (within the limits indicated) is one effective means of finding and developing managerial potential.

Here are two specific recommendations for day-to-day managerial leadership that have critical impact on productivity and growth of personnel but which are rarely practiced consistently:

1. Encourage "work-centered" criticism. Very few managers go beyond *allowing* occasional criticism. The reason for this is usually the ultimately threatening implications of any criticism for the manager. The element of personal threat can be minimized, however, by encouraging critical examination of the work methods and results—without reference to personal responsibility. Even though this approach does *not* completely eliminate implicit threats to security, a critical outlook is believed to be an important element in work quality and the growth process of an individual or a component. It hurts a little, but it pays; and as time passes,

it hurts less and less. This is particularly true when the manager shows by example that he places a positive value on a critical view of the work—especially when the work happens to be his own (21).

2. *Reward "constructive" mistakes.* This means that within the limits permitted by budgets and deadlines, a manager should not only *not* punish people for mistakes made in attempts to improve, he should actually *reward* them in some appropriate form. If improvements in methods and personnel development are desired, mistakes are essential—as they are in all human learning where immediate, total insight is not the rule. One of the great unmeasured losses in business and industry is the unrealized innovations inhibited by fear of disapproval lest the attempt prove a failure.

Two Current Issues. Since the preceding discussion has emphasized a particular approach to managerial leadership, it should—and does—have implications for the controversy over the relative value of "command" versus "persuasion" as a managerial method for dealing with subordinates:

1. "Command versus Persuasion"

Some students of managing suggest that managers should avoid giving direct commands and should use "methods of persuasion" in their place. Apparently, "methods of persuasion" include leading questions, suggestions, recommendations (2, pp. 105–106).

In order to come to grips with this issue, it is necessary to define "command." Webster defines "command" as "to direct authoritatively; to order." But for our purposes this definition needs further specification: Does the source of the authority derive primarily from the *power* designated in the manager's position?—or does it derive primarily from the *responsibilities and knowledge* inherent in his position?

It is agreed that managers should never issue directives supported *only* by the *power* of their position. But it is also believed that there is nothing wrong with managerial directives that stem from the particular set of responsibilities and knowledge that are structured into the organization position filled by a "manager." "Commands" or directives deriving from these factors may be likened to the calling of signals by a quarterback. The team has agreed that this is his appropriate function, and he is *expected* to fulfill it.

The present theory bears on this issue in the sense that, while no attempt is being made to decrease or increase the number of managerial directives, one of our purposes is to plan, organize, and appraise the work of a component in a manner that liberates more of the manager's time and energy for his primary task of *integrating the work of his component with work of other organization components and with the organization as a whole.* Directives to this end will be expected *and required* by his subordinates, since the nature of their positions offers a much more limited view of the larger organization than is available to the manager (16, 20).

There is considerable discussion, both through congressional investigation and among the public at large, as to the long-range role and contribution of large corporations in our "free-enterprise" system. The type of *internal* leadership approach used in these corporations may have a critical bearing on the public's acceptance of big corporations, since the employees of these organizations form a significant source of over-all public opinion.

2. "Legitimacy of the Corporation"

This refers to questions raised by private individuals, unions, and some government officials about whether modern corporations have grown "too big," and have come to possess "too much power" (16). Obviously no attempt will be made to settle this issue here, since there are many factors to be studied in any effort to treat the matter objectively. One point, however, seems relevant: It is believed that one criterion for evaluating the "legitimacy" of a large corporation is *whether it is able to support an internal set of man-manager relationships and general working climate that is at least as conducive to individual self-realization and growth as our over-all national political and social climate.* The recommendations in this paper are seen as containing major potential for fulfilling and even surpassing this criterion.

Conclusion

One theoretical approach to improving productivity, component climate, and over-all organizational integration has been offered. Many excellent efforts toward these goals are already in print. But disappointingly little systematic, empirical work is being done to test these theories. For example, there is a tremendous need for research on such critical items as—

. . . what forms of component and company structure (number of levels, size of "spans of control," communication channels, etc.) are most effective?

. . . what approaches to managing are best suited to different types of organization structure?

Some authors have suggested that as automation and data-processing techniques advance, organizational re-centralization will follow and "middle-management"—as we now know it—will no longer be the locus of significant decisions. From these assumptions, it has been concluded that concern over morale and productivity is likely to fade out as a managerial problem since, "The execution of controllable routine acts does not require great enthusiasm by the actors" (11).

Frankly, this approach seems over-simplified to me for three reasons:

1. Many "rank-and-file" activities today are following a close program (according to the authors cited above), but where is the operation in

which rank-and-file morale and productivity are not major concerns to the management?

2. Even if the new methods should eliminate "middle-management" as we know it today, the leadership and decision problems of this group will, in all probability, shift upward into the "Tight Little Oligarchy" described by Leavitt and Whisler (11).

3. No one has yet suggested that the new methods referred to will eliminate critical decision-making and "front-line" leadership needs in construction and maintenance types of work.

Therefore, I believe that improvements in managerial leadership will be the central factor in bringing our entire social structure closer to its ideal of individual freedom and growth within flexible, productive organizations—for us and for our grandchildren. I hope that business and industry will become increasingly sensitive to the need for basic research on these problems, and will respond by providing many times the men and facilities now engaged in such work.

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4. Good Management Men Delegate Authority *

John H. Gorsuch

The one-man-band type of executive is a common phenomenon in American business. He is invariably busy, so busy that it is hard to get an appointment with him, harder still to keep his attention. The telephone interrupts, people run in and out with papers, problems, questions. His attention is dispersed over a host of minor details. His subordinates invariably must refer problems to him for attention. His frustrated staff keeps busy justifying what has happened. They haven't time to work on future plans and improvements.

Strangely enough, the one-man-band executive always sees himself as a student of organization and a practitioner of delegation. To him, delega-

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tion is the great thing. He proves it by showing elaborate organization charts in handsome bindings. He doesn't seem to realize that delegation on paper is only theory; that true delegation involves people.

Right here is where many executives get off the track. Attention focused on organization structure and charts passes for delegating, and hides the essential thing—how to put delegation into action. Charts may hint at the authority and responsibility supposed to be flowing from top to lower levels, but they don't get it done. Putting delegation into action often requires that people be trained in the skill, just as the machinist has to be trained in his work.

Good delegation practice does not mushroom overnight. From the very start, time and effort and persistence are required to develop the art and keep it alive, because effective delegating is one of the continuing problems an executive must live with. The ideal place to start training an executive is, of course, in his first supervisory assignment. It provides the psychological moment to get him started on the right foot. Up to now he has developed no bad habits in this area, no mental hurdles because of past failures. He can be easily sold on the great need for forming habits of action. But it isn't always possible to begin with the tyro. Habits of action are also needed by seasoned executives.

Most executives have acquired their know-how the hard way. But the know-how gets dimmed by the illusion that delegation is a static thing that, once developed, will stay developed. It won't; and seasoned executives need to put their knowledge into daily performance to keep it alive, or they will fall short of full effectiveness. This is important in any organization, but emphatically so in the larger ones where numerous levels and greater complexity magnify the problems of transmitting authority and responsibility.

How, then, can the executive make sure he is doing the right job? What are the methods he needs to use to train others how to delegate, and for that matter, to keep in training himself?

It will be helpful to examine some of the things that retard delegation in practice.

Unless the executive is willing to impose rigid discipline upon himself, his effectiveness will be limited. Too many bosses do their subordinates' work because they are not conscious that it takes self-discipline to let their helpers help them.

A newly promoted boss should do the job he is promoted into. Too frequently he tends to continue performing the duties of his old job. If a foreman is made general foreman but is not fully indoctrinated in the new assignment, he is likely to neglect his new duties while hanging on to his old familiar tasks. It is natural and easy to continue the duties he should have left behind. Conversely, it requires a high order of self-discipline to trust the replacement man to carry on as he would have done.

But without this self-control, our new executive not only fails to fulfill completely his new assignment, but also hampers his replacement and creates a confusion only too commonly observed. And then, if he is again promoted to department superintendent but still hasn't learned to delegate, he will tend to pull many of the duties of his old foremanship up with him. Indeed, in some extremes, we have organizations with little authority lodged below the vice-president level, so that we find the vice president and his staff doing everything but emptying the waste baskets and sweeping up.

Same Reason Given by Most Executives Who Fail. The executive may not be conscious that his failure to delegate is caused by preoccupation with the duties of his old job. He believes it is something beyond his control. What is the main reason executives give for failure to delegate?

The reason most often given is lack of confidence in subordinates. What does this lack of confidence mean? It may really mean lack of development of subordinates. The boss failed to realize that competence must be developed gradually. Few subordinates perform a delegated function easily or adequately at first. Baseball players don't blossom into big leaguers over night. The subordinate will make mistakes, and the boss must be big enough and tolerant enough to know it and to shoulder the responsibility. Let him plan early assignments wherein mistakes are not disastrous.

Self-discipline has another facet. A subordinate should be granted reasonable opportunity to perform any assignment on his own. How often is he pestered by the boss with a running fire of suggestions and the repeated question, "How are you coming along?"

Another example frequently seen is that of the boss who permits others to bypass his subordinates, or may even do so himself. He may delegate, for instance, the matter of assigning office space, or hiring and firing. But every time an assignment is made, the subordinate can't make it stick. He finds himself bypassed. This tendency stands out in strong relief when there is a desirable plum to hand out; the boss hands out the good things, letting the subordinate handle the unpleasant ones. Executives who tend to do that should ask themselves why.

Again, the subordinate must have elbowroom. He needs latitude to learn by doing, and by making a few mistakes.

That amounts to tolerance in delegation, an element which too few executives have developed into an active practice. No executive should expect a man to perform precisely as he would. For example, if a man is asked to write a letter, he could never use exactly the words the boss would use. So the boss should discipline himself not to make insignificant changes, but only those of real substance. Any subordinate must be permitted elbowroom. Ignoring this can have an adverse effect on delegation practices all down the line.

Another cause of failure to delegate may be a subconscious one. Underlying it is an instinctive resistance to new methods which a subordinate may introduce, to which the superior is not accustomed. The seasoned executive has passed beyond the details of process and procedures that today concern supervisors on lower levels. His thinking harks back fifteen to twenty-five years, and he has difficulty in applying his past experience to the new order. Right here the tendency to keep a tight hold on the reins is almost irresistible. The tight hold can be relinquished only through the exercise of severe self-discipline and trust in the subordinate. But it must be done if the executive intends to really delegate.

Delegation Practices Have Flaws That Weaken Them. Another retardant is fear of competition. Some hesitate to delegate for fear their subordinates may outshine them. This is particularly true with a group of incumbents who have been associated together for years, whose thinking has become inbred, with concomitant stagnation of tolerance. The competition of the new man seems to menace the *status quo,* so they are prone to content themselves with organization diagrams while they withhold real delegation of responsibility and authority.

Delegation practices suffer from another ailment, that of retraction of what has already been delegated. Fear of adverse publicity from inadvertent failure to comply with new laws, or emergency government controls, may make top management hesitate to delegate or cause them to retract responsibilities once delegated. These are real fears to which large organizations are understandably sensitive. But the danger lies in failure to reassign down the line the proper degree of authority and responsibility when the emergency is over.

We have examined first the illusion that organization charts are in themselves delegation and second, some of the reasons why delegation doesn't get done. What can the executive do to get delegating action among his own key men?

It is clear that if the idea and the willingness to delegate are to be transmuted into action, the technique cannot be learned and then shelved. It requires continuing exercise. How is one to improve executive facility in this area? The matter cannot be tackled on an informal, unplanned basis. It is too important for that. Without systematic, conscious effort, a hit-or-miss job will result, delegating skill will atrophy, and the transfer of authority and responsibility will remain an illusion.

Division of Work Is Needed for Good Planning. Here is an example familiar to everyone. How often have you seen two, three, or even four levels of supervision looking over a broken-down machine that is definitely the province of the junior supervisor? Will the foreman learn to carry the ball if the department superintendent is always breathing down his neck? Will the superintendent learn how to delegate if he can't trust the fore-

man? Good delegation begins by making sure each executive understands the need for division of work, and then by planning for it.

The first step in improving delegation on the part of any executive is to focus the attention of his organization on the matter, and stimulate their interest in doing something about it. The easiest and best way is to utilize the normal communication channels in the daily business situation. He can give the topic a prominent place at staff meetings and in individual discussions with subordinates, pointing out its importance to effective organization operation and stressing that he considers it a major element in judging an executive's competence. Such discussions also should provide information regarding the nature of delegation. Stress should be given to the two facets, authority and responsibility. The discussions should thoroughly overhaul the reasons why executives fail to delegate properly. Of course, whatever he says, to be effective, must be reinforced by good example on his own part. There is no use talking delegation if he doesn't intend to practice it.

Good Organization Chart a Must for Efficient Operation. Next, to provide the proper background for effective delegation, there is need to develop an organization chart and related job descriptions if it has not already been done. These block out each man's assignment and its relation to other jobs. They avoid confusion and conflict from overlapping or haphazard arrangement of duties. The utility of these familiar tools needs no further elaboration. The important thing to remember here is that these tools are but a single step.

With this accomplishment, the executive should have a plan or systematic program to help him and his subordinates to be delegators. A formal program should provide a pattern for discussion and work with subordinates to show each one his place in the over-all organization and to clarify the authority and responsibility to be delegated.

Starting at the top, each subordinate executive is made aware of his particular role in the delegating pattern, by his boss. He is made aware of the limitations of the organization chart. He learns that action is wanted, that a conscious effort to delegate is to be made. Delegating means investing with authority to act for another, and this investing flows from the top down. He learns the significance of these words and their far-reaching implication, and he learns that he can't be content with mere willingness to delegate.

Each executive plans work assignments for his subordinates which are consciously aimed at achieving delegation in action. He explores with his people the facets of their authority and responsibility. In doing this he needs to accomplish two things. First, he must succeed in defining the area of each man's job. The details must be filled in on the job, clarifying formal and informal relationships, to establish when and

where the authority and responsibility of each man begins and ends. Second, he uses the daily work situation to develop the skills that make delegation work smoothly.

One of the skills is that of giving sufficient instructions. The lack of adequate instructions when delegating is almost as commonplace as the failure to delegate. When subordinates walk out of the boss's office with a hazy or incomplete picture of what their assignments are, how far they are to go, or when the job is to be completed—all of these are the result of inadequate explanation and instruction by the boss. Supervisors need to learn how to give sufficient instruction when making assignments and how to set up time schedules for interim reports and for the completion of the job.

A detailed discussion of the reporting aspect of delegation is not possible, but this much should be said: failure to plan adequate reporting procedure is the downfall of many executives. He who delegates with no provision for planned follow-up puts himself in jeopardy through failure to provide the guidance a subordinate must receive. Follow-up devices are evidence of the executive's interest.

Subordinates Should Report Regularly to Their Boss. The devices adopted will, of course, vary with the situation. By working together, boss and subordinate can crystallize procedures which are appropriate to the particular job. Staff meetings, group conferences, individual discussion, personal visits to the work situation, progress reports and work diaries are common devices. By means of one or several of them, the subordinate finds out when he should check back with the boss and others, and how to inform the boss of progress.

In summary, a planned approach to delegation embodies the use of all the devices previously discussed, the organization chart and job descriptions, the perfection of reporting procedures, coaching on the job, plus a schedule of initial assignments. These initial assignments can be followed by those of greater complexity until, assignment by assignment, the subordinate becomes competent in the full scope of his responsibilities, and the delegating powers of executives throughout the company are revived and freshened.

The example of the football coach was never more apt. The coach can give endless chalk talks to explain the plays, and he gets pretty good pay for it. But it would be ruinous if he did not keep off the field during the game. Real teamwork in action requires individual initiative to execute the plays on the field against the opposing team. Like the coach, the executive must take time to discuss performance with his subordinates on a regular, planned basis, and then let them play it out.

Failure to Give Proper Rewards Is Bad Business. Finally, to give the matter real impetus, it is necessary for the boss to reward subordinates who become adept. He should let the organization know that in con-

sidering personnel for advancement or merit increases, close attention will be paid to effective delegation practices. Of course, it goes without saying that he had better never bring up the matter if he isn't going to make good his statements.

Every executive can, of course, take the initiative toward active delegation in his own segment of the organization. He can develop his own ways and means, but sponsorship by top management can do much to foster such individual effort. Even an executive at a senior level is restricted by the practices of his associates and controlled by the amount of authority that has been delegated to him. Thus, top management attention and energetic participation are required for full effectiveness.

Top management and only top management can provide a climate conducive to maximum progress. It can adopt policies which focus attention on the matter and provide for a planned approach on a company basis, so that executives have the necessary personnel tools to implement the program. Also, it can maintain interest and momentum through a definite policy of giving recognition to those executives who succeed in developing their subordinates to the point where they can and will discharge the responsibilities delegated.

But most of all, executives comprising top management can make their greatest contribution in the example they set in their day-to-day work with subordinates. Also, executives at the top level can motivate subordinates on a continuing basis through carefully planned discussions at staff meetings or other group functions. They can initiate the movement of authority and responsibility down the line, since delegation flows down, not up.

It should be apparent that the problem of delegation is so closely tied to the daily work habits of executives that it is primarily an on-the-job problem of the line executive. This limits the contribution the personnel man can make to that of advisor and catalyst.

Nevertheless, there are specific things a personnel man can do. Recalling the several obstacles to good delegation, it is apparent that he can make a major contribution in helping formalize orientation and training for executives assigned to new positions.

The importance of the formal program gives scope to the personnel man. Once the program has been developed, there still remains the problem of tailoring it to the specific requirements of each executive's organization, and the personnel man should be called on to help. Many seasoned executives need assistance to provide sufficient instructions when delegating, to devise proper reporting procedures, and most of all, to develop the skill needed in coaching subordinates. The personnel man can be a catalyst in maintaining interest and attention through his personal contact with executives, and at staff meetings and other executive get-togethers.

Delegation in action is made up of a number of specific steps. Time and effort are needed to take the aim away from a paper target and fix it on action. It isn't easy for the one-man-band executive to change his ways, but the more surely he is impelled to do so, the more competently he will carry increasing responsibilities as he moves upward, and the easier it will be for his associates to work with him at every level.

Perhaps the most important achievement is the enormous difference his new habits will make in his subordinates. Failure to delegate impairs the boss's effectiveness, but worse, it blocks the sound development of his juniors. Indeed, the degree to which an executive develops his subordinates is a measure of his effectiveness as a delegator. It follows, then, that delegation in action is a fundamental of management development.

The organization is the sum of the characteristics of its people. A good delegator is looked on as a fine example of high management development. He doesn't cling to little powers. He is able to relate himself to the needs of the job, rather than try to mould the job to his own ways. He grows tolerant, lets his people develop. He knows his subordinates are good, and he provides opportunities for them to do their best so that they can get better. An organization made up of such people has character. Its tone rings true. Its progress is just as steady as that of its executives.

5. Leadership Pattern in the Plant *

Chris Argyris

This article describes some of the methods used by a brilliant man—the Leader—to administer a deteriorating organization so that in a few years' time it became, according to the management, the best division, morale-wise and profitwise, in the entire corporation. Focused as it is on the relationship between the Leader and his 20 middle-management supervisors, the article should be of particular interest because the findings disclosed run counter to many conventional "human relations" ideas.

Note that I say "Leader" with a capital "L." Because of the confidential nature of the data, that is the only name and title he can be given here. Moreover, I want to remind readers continually that a particular individual is being discussed, and that this must be taken into account

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when they try to apply the findings, as I hope they will, to other administrators operating under similar conditions.

My objective is to describe concretely and accurately the Leader in action. This I shall try to do on the basis of interviews and observations made over a two-year period—intensively, almost constantly, for one year; intermittently for another year.

My objective is *not* to pass judgment on the man's *leadership pattern*—meaning by that simply the way he leads people, whether expressed as a "style," a "method," or a "set of rules" of leadership, and whether derived from his experiences with other people or stemming from his own personality needs. In fact, I want to avoid *any* evaluation which suggests that I am against the ultimate aims of human relations. I believe strongly that employees must have all the opportunity that can be given them to work under leadership which provides room for individual creativity, happiness, and growth.

Further, I suggest that readers also refrain from making immediate judgments. Let us, for the time being, not concern ourselves with whether this man's leadership pattern is inherently "good" or "bad." All we need to know at this point is that it *works* and in that sense is successful. This way we shall avoid the misleading prejudgments which might otherwise be caused by lack of understanding of the situation in which the Leader operates—particularly, the condition of the organization as it was when he came to it and of the tactics he used to meet the problems he found there.

The Particular Situation. The division which the Leader heads turns out custom-made and standard products for an increasingly competitive market. The plant is multistoried. There are about 650 employees, most of whom belong to a union.

When the Leader was assigned to his position, he found that the plant was many thousands of dollars in the red. It has been losing money consistently. The organization had previously been administered loosely by a benevolent, kindhearted man. To quote one of the employees, it had been run like a "corner drug store." Anyone could go directly to the top man with any kind of trouble. In this situation, the morale of workers was relatively good, but the supervisory positions had been undermined. In fact the point had been reached where people preferred never to become supervisors.

One of the Leader's first decisions was to rejuvenate the supervisors and raise the status of their positions. He worked hard with the supervisors and continually encouraged them to better themselves and their departments. In short, the Leader felt compelled to use some pressure to instill motivation, raise efficiency, and increase the over-all effectiveness of the organization. And there is abundant evidence that he secured the desired results.

Use of Pressure. The Leader's use of "pressure" deserves special comment—if only to emphasize further the danger of making value judgments without full understanding of what is actually going on. In this case pressure means such behavior as when the Leader (a) repeatedly coordinates and controls others in a directive manner, (b) repeatedly checks on supervisors to make certain they follow directions, and (c) repeatedly sets supervisors' goals just high enough to present a challenge but low enough to be achievable by hard work.

The Leader is not alone in his use of pressure. Many line executives in highly competitive industries recognize that they use pressure to motivate people to improve their performance. Furthermore, the fact that pressure is not *necessarily* bad is supported by some recent findings on the motivation of individuals. In some experiments on frustration with children, scientists have found that mild frustration increases the effectiveness of the children's activities.[1] Therapists believe that one of their primary tasks is to utilize and, at times, create tension within a patient in order that he will feel a need to change. Psychologists inform us that some of this country's most creative men are motivated by deep internal tension.

At the same time, experienced line executives recognize that the application of pressure, beyond a certain point, is likely to give rise to frictions within the organization, with subordinates trying to duck out of the pressure by passing the buck or hiding their errors. More extreme pressure can even destroy the individual's motivation to do a job. Thus, executives are continually seeking to arrive at an appropriate balance in the application of pressure.

Understanding what is the appropriate balance is not an easy task. Only by examining actual cases where pressure is being applied can some sort of conclusion be developed. Our Leader seems to be very careful in applying pressure. He is always on the lookout for the effects of his actions on the supervisors being motivated. Moreover, to quote one supervisor, "If he bawls you out, you know that he forgets about it. He never holds it against you."

One cannot help but see some similarity between this behavior and some recently discovered notions about discipline. The suggestion is that discipline is most effective, and has least negative effects upon individuals, if the individual receiving it feels that his behavior at that particular moment is the only thing being criticized. In other words, he is not made to feel that he is being hurt or rejected as a person.

The Leadership Pattern. Let us now turn our attention to the leadership pattern. I shall begin by describing it from my point of view—an

[1] Roger G. Barker, Tamara Dembo, Kurt Lewin, *Frustration and Regression; an Experiment with Young Children*, Studies in Child Welfare, Vol. 18, No. 1 (Iowa City, University of Iowa, 1941).

outsider's. In so doing, I will use actual concrete examples of situations in which I observed the Leader in action. Then, I shall give the Leader a chance to give us his own picture of his leadership pattern, his view of himself, and his beliefs about effective executive leadership. Following the presentation of both points of view, I shall describe some of the effects of the leadership pattern on the Leader's subordinates.

Outsider's Viewpoint. 1. The Leader is constantly interacting and constantly commanding. One of the strongest and most frequent characteristics of the Leader's leadership pattern is his constant interaction with the supervisors. He is continually "on the floor," talking with them, giving them his views, listening to theirs, and making on-the-spot decisions. Even when he becomes tired and leaves the floor to go to his office, he immediately calls in some individual or some group of supervisors to discuss one of the many current production problems.

Moreover, in the majority of his contacts with the supervisors, the Leader is continually taking the lead, interjecting new ideas, asking important questions, and usually coming up with some decision before any of the supervisors begin "to see the light."

Consider the following illustrative incident—one out of many—a meeting between the Leader and Supervisor A:

A few minutes before he was called to the Leader's office, Supervisor A was having an early-morning meeting with some of his "subforemen" regarding a knotty production problem. Supervisor A was doing his best to consider all aspects of the case before making a decision. Suddenly the loudspeaker interrupted with "Supervisor A . . . Supervisor A." He dropped his pencil with an air of disgust and remarked: "Damn these interruptions. Well, that's it, boys. I've got to see the boss. Now what the hell did I do with those production reports on that faulty stuff that was sent to us? . . . Oh, yes, here they are. I'll see you fellows later."

As he started to leave his office, the phone rang. Supervisor A rushed over, jerked the phone to his ear, and said hurriedly, "Yes . . . , speaking." The voice on the other side of the line said something which made Supervisor A red in the face. He replied, "All right, I'll be right there. I just heard it over the speaker!"

He hurried to the Leader's office door, suddenly slowed his pace, and knocked softly.

Leader: "Come in, come in, I've been waiting for you. . . . Glad to see you. How are things going today?"

Supervisor A: "Fine."

Leader: "About that material. What's the beef that your gang has?"

Supervisor A [very cautiously and slowly]: "It's this material—this material that I mentioned last week. We've been having trouble with it. The trouble is it is not our usual quality. Don't you think it's the purchasing department's fault? Well, you know, he ought to take care of getting us the stuff we asked for."

Leader: "Why certainly, that's his job! You tell him I told you that's his job. Now, look here, you know what to do. Why don't you really do a job on this? I mean a real job."

Supervisor A [visibly upset]: "Well . . . you see . . . it's . . ."

Leader: "I mean a job. Take it over to number two. Lay it out right. Put a few men on it. Get the thing out right away. You know what to do about poor material."

Supervisor A: "Well, we're catching up on it."

Leader: "Do you have men working on it?"

Supervisor A: "No, not . . ."

Leader: "Why not?"

Supervisor A: "Well, we don't have any extra . . ."

Leader: "What do you mean? What the hell are you doing with Joe?"

Supervisor A: "He has to take care of bags that we . . ."

Leader: "Now wait a minute. I spoke to Supervisor C just a little while ago. He said that he was taking care of that problem. Look, let's do a job on this. Come on now. You'd better see Supervisor C on this and get this thing straightened out right away."

2. *The Leader's personal goals, values, and feelings are all organizationally centered.* His primary concern in life is the organization. He literally thinks, eats, and sleeps his job. And as a result of his own emphasis on the welfare of the organization, the Leader also insists that the supervisors exhibit equal loyalty. Loyalty, in the Leader's eyes, requires that the supervisors reshape their personal goals and feelings to the organization's requirements.

An example of this attitude was taken from a management "bull session" between the Leader and some of the supervisors. The supervisors were discussing the problem of informal restriction of production:

Supervisor E: "But I still say the new supervisor has to overcome the locker-room talk where somebody comes up and says, 'Look, what do you want to do, kill the job?' The new supervisor is doing an outstanding job, but he has to decide whether he wants to adjust his work to the group and be accepted by the group, or whether he's going to say, 'To hell with the group.' Now, how does a supervisor handle this? How does he adjust to this group idea of what is good production?"

Leader: "I think a good leader can get in there and talk with the boys. I don't believe he has to say, 'To hell with the group.' But I do think he should be a leader to the extent that he'd say, 'We've got to get the best production possible.' He'd get the group to go along, no matter what, and still be on good terms with his group."

3. *The Leader makes the organization a part of his self-picture.* Not only is the Leader completely oriented toward the organization; he goes one step further and makes the organization a part of his self-picture—meaning by that his conception of himself, including all his feelings, prej-

udices, needs, goals, values, abilities, and so on.[2] This is much further than most people go in loyalty to an organization.

Once a person forms a picture of the self, it serves him as a guide for evaluating his experiences, All future experiences, therefore, are (a) accepted by the person and integrated with the picture he already has of himself, (b) ignored because the experiences do not make sense to the person, or (c) denied or distorted because the experience is inconsistent with the picture of himself. In other words, a man tends to adopt those ways of behaving which are consistent with the picture that he already has of himself.

Perhaps in this case there is a basic agreement between the Leader's personality needs and the organization's demands. If the Leader's personality actually requires that he command others and be the focus of attention among others, and if his organizational job is defined to permit these needs to be fulfilled, then it is understandable why the Leader can make the organization part of himself. The fact that he has done so helps to explain the complete loyalty which he exhibits toward the organization; that loyalty of course provides him with important personality satisfactions.

The Leader in his everyday evaluations and in the yearly merit ratings of supervisors does his best to be as fair as possible. But his evaluations are affected by his conception of himself. If a supervisor tends to be like him, the supervisor receives a high evaluation; if he is different from the Leader, then the supervisor has something to learn. During a conversation with me, the Leader stated:

"Do you want to know a good man? There's Supervisor F. He's going to get somewhere. Of course, this is because he's been around me. I can see him use my kind of thinking all the time. Supervisor F is close to me because I've been able to guide him.

"On the other hand, take Supervisor B. I'm having trouble with him. He's a nice fellow, but he's not like Supervisor F. He's a long way off. He's got to go quite a ways before he ever gets to my thinking."

4. The Leader handles the supervisors as individuals rather than as members of a group. The Leader treats each supervisor differently from the way he treats the others. If he is to reprimand three supervisors, he usually calls them into his office one by one and reprimands each according to his conception of that supervisor's "human nature." The Leader shows little insight into the fact that the supervisors are actually part of a total social system and that as such they may interact with each other concerning their relationships with the boss.

The Leader's practice of handling his supervisors as individuals con-

[2] See Carl R. Rogers, *Client-Centered Therapy* (Boston, Houghton Mifflin Company, 1951), pp. 497–500.

tinues even when he meets them as a group. The primary patterns of interactions seem to be from the Leader to a supervisor or vice versa. Little interaction occurs among the supervisors. About the only occasions when these men speak directly with each other are when they are contradicting each other, trying to place the blame on each other, trying to give each other some information, or simply reinforcing something that the Leader has already stated.

Consequently, these meetings of Leader and supervisors are characterized by competition for the Leader's praise. This serves to align the supervisors against each other, which in turn tends to emphasize the importance of the Leader and the dependence of the supervisors on him, and this in turn helps maintain the Leader's perception of the necessity for his leadership pattern. Moreover, he senses the supervisors' dependence on him and thus becomes more assured of his importance.

The crucial question is what the chances are for an effective team to be built up among the supervisors if they are kept ignorant of their fellow supervisors' relationships with the Leader and if they require the Leader to solve their quarrels for them.

5. *The Leader controls the transmission of important information.* By the very nature of his position, the Leader is placed in control of receiving and transmitting the communications that emanate from above. He makes it a point to communicate any important information that is designed for the entire plant first to the supervisors and then to the employees. Receiving the information before the employees emphasizes to the supervisors that they are "on the management team."

In most cases the Leader transmits important information as soon as he is able. There are times, however, when he temporarily withholds information, either on instruction from top management or on his own decision. For example, it may be that he knows a new plant is being built and that some of his subordinates are to be considered for transfer and promotion. The trouble is that in the meantime the supervisors hear of the possible changes through the grapevine and then have to go to the Leader to try to obtain further information.

Of course, the fact that the supervisors view the Leader as their source of important information and continually turn to him for it reinforces their realization that they need the Leader.

6. *The Leader emphasizes the present.* The Leader seems to care little about the past; and even less about the future, which he considers is for the "long hairs" and the research workers. In short, he sees his security as lying in day-to-day living. He is constantly making statements like these:

"We just can't wait in business."

"The fundamental results are what count, and these results occur today, not tomorrow."

"Time is valuable in business; it costs money."

Since the Leader controls the information channels, and since his emphasis is upon the present, the information transmitted is primarily in terms of what is important in the present. Here, again, we get that reinforcing effect. Since the supervisors know little of the future, they need to turn to the Leader for future guidance. Similarly, since the Leader must keep the supervisors informed from day to day, he tends to find further reason for his constant interaction with them. Such interaction, in turn, tends to increase the Leader's importance in his own eyes as well as in the eyes of the supervisors.

7. The Leader sets goals realistically. The Leader sets his goals just high enough so that effort is required to achieve them, but not so high that they are unattainable. Over and over again, the Leader emphasizes in supervisory meetings that one should not try to aim for a job that is two or three rungs up the ladder; one should aim for the next rung. Similarly, he cautions his supervisors about committing themselves or their workers to unrealistic production goals. For example, during one supervisory meeting he told the supervisors:

"It seems to me that a supervisor could help a girl get more enjoyment from her work if he told her to start in the morning of her first day and set a realistic goal. Keep track of how much she makes. Once she has met this goal, then she would be asked to try to better her record all of the time. I think that this is one of the problems in industry. Many supervisors try to set goals too high, and the result is that their workers don't meet them and consequently feel terrible."

This rounds out the picture of the Leader's leadership pattern as it appears to the outsider. His own picture follows in the next section; it is what he calls his philosophy, adding the comment, "My leadership philosophy is very close to my heart."

The Leader's Viewpoint. 1. I believe firmly; I defend doggedly. The Leader feels that, whatever a man's beliefs are, he should believe in them firmly and he should be willing to defend them against "all comers" and "all odds." As he says:

"All my dealings with people have been with these principles in mind. If a leader believes in something, and if he really knows that something is right, he should stick to his beliefs. He should be able to defend his beliefs in front of anyone."

Coupled with firmness of position, however, the Leader suggests there should be fairness. More specifically, he believes (a) that a leader must make certain that he has all the important facts regarding any problem and (b) that he must weigh them carefully and decide only after he is certain he has examined all the facts. When asked whether any person can ever have all the facts, the Leader retorts, "A good leader *always* has *all* of the facts." Moreover, when he is questioned about the possibility

of two different people having two equally plausible but antagonistic sets of facts, the Leader is quick to point out that an effective leader can always show that only one set of facts, in the final analysis, can be correct.

2. *I work hard; I am bold; I always get the job done.* The next aspect of leadership that is important to the Leader is concerned with his deep desire to work hard and to get the job done in the best possible manner. If he does this, he is a realist, and "all leaders must be realists." In his view:

"The primary job in life is to get your job done. I just can't see how some of the fellows in this plant expect to get ahead if they don't work hard in their job. I can't figure these guys out who spend all their spare time in sports or something like that."

Getting the job done may take more than hard work; a leader must often show boldness too. He should "pull no punches"; he cannot afford to. An effective leader should be "straightforward," "honest," and permit the "chips to fall where they may." After all, suggests the Leader, it is not he who dictates where the chips should fall; the job dictates such things.

If a leader creates a few enemies in getting the job done, then he should be careful to discuss this with the persons involved. An effective leader never "holds grudges," never leaves people with "hurt feelings." If necessary, he keeps them in his office and talks to them until he is certain that they no longer feel hurt. But, the Leader is quick to point out, such "smoothing over" discussions, necessary as they are, should come *after* the job is done. Nothing should stand in the way of completing the job. He goes on to point out:

"The boss is the man that counts, so you might as well work hard for him. You know, some people think they can change the boss. I wonder. Seems to me, more like it, he will change you."

3. *I keep my eyes open for opportunities to get ahead.* The Leader feels that a man without a burning desire continuously to raise his sights is not much of a man, and even less of a leader. He says:

"I can't see how some fellows live without having some goals in life. The fellow who is going to get ahead is the one who wants to get ahead—the man who has the push in him.

"Now, to Bill over here, money and advancement don't mean much. To him, opportunity means doing his same old work. To me, opportunity would mean the possibility of getting ahead and making more money. Maybe it's not everything, but money is important. I'd like to have the opportunity to double my salary."

The Leader is quick to add that advancement is hastened (a) if the person develops "contacts" and (b) if the person has the ability to be a good leader. If he has both these attributes, then he should have little difficulty in "selling himself" to the proper people.

4. I keep my supervisors close to me. One of the points the Leader keeps repeating is that he feels that the supervisors must be close to him and on the management side—and that, conversely, he must always back up his supervisors. The Leader seems to be suggesting that his leadership pattern could not be effective unless the supervisors were "on his side." He says:

"The worst thing a management leader can do is to by-pass his supervisors. You've got to have them behind you, or else you're licked. The supervisors are the backbone of management.

"I believe that sincerely. I've worked hard with my boys. I think I've made some of them topnotch men. Together we will get somewhere. Together we'll work on the other employees."

(One almost obtains a sense of "about-face" as he listens to the Leader describe his need for the supervisors. Here is a man who insists that an effective leader can "stand on his own two feet," and yet now he is equally insistent that he cannot get far without good subordinates. Could it be that the Leader has, as the psychologists would tell us, a sense of insecurity which, not unnaturally, he overcomes by gathering his subordinates close to him?)

5. I make supervisory positions highly respected in the organization. This characteristic follows directly from the previous one. If supervisors are important, and if they are to be respected, then it follows that their positions in the organization must be respected. The Leader insists that the first step an effective leader takes when he gets into a top position is to build up the prestige of his supervisors. He says:

"I want to get the supervisor's position so that a fellow will strive to be a supervisor rather than avoid it. We have people in our plant who avoid a supervisory job. All plants have that. I think one thing you've got to do is to give the supervisors the authority they deserve and require."

Effects on Supervisors. Let us turn now to an examination of some of the effects of this leadership pattern on the supervisors. More specifically, we are going to examine what happens to the supervisors when the Leader is not present—in other words, their informal activities.

Informal activities are responses that people make when they are trying to adapt to a certain set of circumstances. These activities arise from at least three different causes: (*a*) the supervisors' need to express their pent-up feelings due to the frustration and conflict that they experience in their working world, (*b*) their need to behave, at times, in an independent manner, and (*c*) their need to express normal feelings of antagonism that are bound to arise when men work closely, under the conditions described so far.

A crucial problem immediately arises, since the behavior required to fulfill the needs listed above is different from that which the Leader

rewards. Thus at times the supervisors feel that they want "to tell each other off." At other times they "wish the Leader would leave them alone." Conflict and tension loom on the horizon because this sort of behavior is at odds with the picture the Leader paints of a "cooperative team" working together, with him as the quarterback; hence there is perennial fear on the part of the supervisors that the Leader may discover the antagonistic nature of their informal activities.

The supervisors try to "resolve" this problem by simply keeping any antagonistic informal activities secret from the Leader. However, their attempts to keep such activities secret are undermined by various members of their own group. The Leader knows that the supervisors will not tell him everything, and he has a few supervisors who, in order to gain his favor, act as "information gatherers" for him and keep him posted on the informal activities. At the same time, even these information gatherers have their own limits as to what information they will convey.

Interestingly enough, the supervisory group seems to have a pretty good idea of the identity of these men, and is tolerant of them. In fact, the supervisors sometimes plant rumors with these "informers" in order to communicate certain information to the Leader which they do not want to communicate directly. Thus, in some respects the information gatherers become a two-way communication link between the Leader and his supervisors.

Barrier of Secrecy. Placing a barrier of secrecy between the Leader and the supervisors can only cause a weakening of the organization. It prevents upward communication of the important human problems that are creating difficulties. An interesting example arose at the end of some intensive human relations training, when the supervisors were considering the possibility of sending a report to the Leader listing the major problems that had been discussed during the session. This would mean that the negative data concerning the Leader, the pent-up feelings of the supervisors, and the hostility that existed in the intersupervisory relationships which had come out into the open during the course would become known to the Leader.

According to the analysis above, the supervisors would not be expected to agree to such a report. If they did agree, it would probably be only after considerable argument. Here is what actually happened:

> The supervisors discussed the possibility of a report for two hours. They all agreed that it was a good idea for the Leader to know about their problems, but there was complete lack of agreement as to what problems should be sent to the Leader. Every time a topic was suggested, it was voted down because it might have "bad" effects. Here are some of the remarks made during the second hour:
>
> *Supervisor L:* "If we don't make a report, it's sort of like admitting that we haven't solved anything."

Supervisor K: "If we don't bring a report to him, how the hell is he going to do anything about our changes?"
Supervisor C: "We should have a general over-all report. Not a specific report."
Supervisor A: "Can't we summarize some of those weekly reports and use that? That's general enough."
Supervisor I: "Well, we have to talk about the boss. Maybe we can throw a few stones at the boss."
Supervisor R: "You can't get away with it."
Supervisor A [desperately]: "Can't we say anything good about him?"
Supervisor F: "I don't think we should mention the boss."
Supervisor G: "Why not? The plant would run without him."
Supervisor M: "All kidding aside, I think we ought to leave him alone."
Supervisor A: "It's not his needle that we're worried about; it's his sledgehammer." [The whole group roared with laughter.]
Supervisor F: "Hell, the boss is like anyone else."
Supervisor E: "That's right; he drinks, he sleeps, and he eats."
Supervisor L: "As soon as he reads this report and wants to know something about it, he'll find out about it anyway."
Supervisor E: "Well, hell, fellows . . ."
Supervisor A: "Are we men or mice?" [The group again broke into laughter.]

The group never reached a decision as to what should be in the report. Finally, in the last few minutes they agreed to "allow" the research people to write a report and submit it to them for their approval before it was submitted to the Leader. They gave instructions that no specific problems, people, or incidents could be mentioned. As the meeting came to a close one of the supervisors said, "Just one thing; I'd like you research people to give us a 24-hour lead on him, because once he gets it, *he'll start popping questions!*"

Some days later, in the management smoking room after lunch, a group of supervisors and a research man were talking about the lack of cooperation in the plant, when another revealing incident occurred:

The discussion had reached the point where the various supervisors were citing examples of just how bad the cooperation was. Suddenly the Leader walked into the meeting. Everybody said hello to the Leader. Then a silence ensued; everybody waited for the Leader to say something. The wait was a short one. The Leader began to talk about the plant and some production problems. After a while the Leader turned to the research man and said: "You've been here for a long time. Tell me, and tell these other fellows, what you've learned, if you've learned anything."

The research man suggested that there might be room for improvements at certain spots. The Leader retorted: "What do you mean? We have good cooperation, don't we? Now you fellows be honest. Tell him, don't we have good cooperation?" The result was as expected. Not one supervisor answered in the negative.

The Leader left the scene convinced that the research man was "all wet." As soon as he left, all the supervisors left behind him. None seemed to "stick around" to continue talking with the research man. A little later one of the supervisors saw the Leader and told him that what the research man really

was getting at was lack of coordination, not cooperation, and maybe what was needed was a planning coordinator.

Not only were these supervisors keeping the real problems in the plant concealed from the Leader, but one of them in doing so tried to turn a basically human problem into a technical problem. One wonders how often that happens in industry.

Cooperation among Supervisors. Previously we have seen instances of the lack of cooperation among the supervisors. Let us examine this problem more carefully so that we can relate it to the leadership pattern.

The Leader is directly in control. The supervisors learn to compete "diplomatically" with each other for the scarce rewards the Leader offers. Furthermore, the Leader continually emphasizes that each supervisor should worry about his own and primarily his own department. This policy is reinforced by the kind of accounting, production, and other control records utilized by the organization.

As a result, the supervisors learn to become centered around the problems of their own department. They worry little about the over-all organizational problems. It is not difficult to see how the supervisors, working under such conditions for many years, find it difficult to work cooperatively. For example:

Supervisor B: "Last week we had a government order, and in five days which included Saturday and Sunday they wanted the whole thing done. The order was duck soup to us, but it was tough. A lot of the other boys had problems with it."

Supervisor A: "It was a dead duck—to us. That's the trouble around here; no one particularly gives a damn about the next guy."

Supervisor S: "It wasn't my fault the order got messed up. So I try to pass the buck on to somebody else. The point is, where do you become a heel, and where don't you?"

Supervisor E: "Are you complaining? We all got the same problems, haven't we?"

Not all the relationships among supervisors, however, exhibit a lack of cooperation. There are times when the supervisors work cooperatively and with a minimum of hostility. But the point is that these instances usually have nothing to do with achieving an organizational purpose. They are related to the supervisors' needs to know the disposition of the Leader. For example, there is an informal agreement among the supervisors that whoever "visits" with the Leader first in the morning will contact the others and inform them how the Leader feels and "what he's hot on today." Needless to say, this supervisor achieves quick communication to the rest of them.

Once each supervisor receives the information, he will check with his own subordinates to make certain that the Leader does not "catch me with my pants down." If the Leader seems to be worried about errors, all the

supervisors emphasize the reduction of error in production; if they think the Leader is worried about production rates, they try to step up production; and so on.

The Supervisors' Dependence. One of the crucial results of the leadership pattern is the dependence of the supervisors on the Leader. The Leader is an indispensable link in the management of the organization. He is the sun; the supervisors are the satellites. Without him the cohesiveness and effectiveness of the supervisory group are greatly diminished. Here is an example:

The supervisors were attending a meeting called by the Leader. The Leader, in his usual manner, informed the supervisors that a drastic error had been made. As a result of the error, the customer was returning all of the merchandise. The plant had to rework the order.

A supervisor, with an eye to the Leader's desires, suggested that since the error budget was "way over," the supervisors themselves ought to work on the order. If they did, the plant would not have to pay overtime to the employees. The Leader agreed and requested volunteers. The supervisors as a group pledged a few evenings a week and Saturday all day for as long as needed to rework the order.

The first meeting of the supervisors was on the following Saturday. All were there. The task they had to perform was not difficult; it involved nothing more than sorting out the work, and the engineering department had set up some simple measuring devices. *But the Leader was not present.*

There was so much disagreement as to the best method for going about the job that hardly any work at all was done that day. The supervisors became irritated with each other. Each tried to tell the other, "Let's get at this; the earlier we begin, the earlier we finish." One supervisor remarked later: "I'll tell you why no work was done. It's because these supervisors are *independent* people. They're not used to taking orders. If we want results, we should say, 'Okay, here it is, you guys; do it this way; don't ask any questions!' "

On Monday, when the report of the lack of production reached the Leader, he instructed all supervisors to come to the plant that evening. That evening, he told the supervisors that he was sorry things didn't work out. He pleaded with them to work together as a team. He announced that he would work with "the gang" and the firm would buy them all a big steak dinner as soon as the job was done. The supervisors responded with a few loud cheers; and with the Leader "in the lead," they worked steadily for the succeeding four hours.

The next few evening sessions were extremly productive. Suddenly, on Saturday morning, the Leader announced that he had to fly to Washington for a new government order and therefore would not be able to work with them the following week. He reminded them of the fine work they had done as a team and ended by recalling the steak awaiting them "at the end of the road."

The inevitable happened. The first meeting after the Leader left was attended by only three-fourths of the supervisors. Two sessions later the attendance had dwindled down to two supervisors. All supervisors, except these two, suddenly found themselves with "sick wives," "sick children," "wife's folks in town," or "just plumb beat out."

It is interesting to note who the two faithful attenders were. One was a man who was doing his best to make a good impression so that he could climb the organizational ladder. The other perceived himself as the most "needled" supervisor in the plant; he hoped that the Leader would now realize who *really* was loyal to the company and proceeded to prepare a secret attendance report to present to the Leader upon his return.

Relations with Employees. Are supervisor-employee relationships affected by the leadership pattern? Do the supervisors try to lead their employees in the same way as the Leader leads them? We might expect that they would, since the Leader rewards and perpetuates those supervisors who tend to express a leadership pattern similar to his own, and since it is a well-established psychological fact that if people cannot give vent to their pent-up feelings in relation to their supervisors, they tend to do so in relation to their subordinates.

But actually things do not work out that way. There appear to be four reasons why:

(1) The supervisors have so many employees under them that the constant, close interaction required in such a leadership pattern is not possible.

(2) The supervisors are directly dependent on their employees to achieve the goals of the work-flow process. They cannot encourage the same kind of informal activities that they use themselves to express their pent-up feelings. Moreover, the employees, unlike the supervisors, have a union to turn to if they are dissatisfied.

(3) For a leader to make his supervisors as dependent as they are requires substantial authority over the reward-and-penalty process. Although the Leader has such control over supervisors, the supervisors do not have it over their workers because of (*a*) the centralization of hiring, firing, and salary increases in the personnel department and (*b*) the rise of the union in the plant.

(4) The conditions characteristic of the Leader's relations with the supervisors are completely against the union's philosophy. For example, the union through its contract does not permit complete unilateral control of all the formal processes by management. Moreover, it refuses to permit the employees to be treated individually and secretly; a shop steward must always be present. Placing the employees in competition with each other is also outlawed. Furthermore, the union attempts to obtain the employees' loyalty to the union goals, values, and demands; sole and complete loyalty to management is fought by every possible means. Finally, one of the union's battle cries has been the necessity for individual personality expression on the part of the workers.

Even so, there is ample evidence that the supervisors *on occasion* behave as the Leader does. If an employee has a poor production record, or if he is a trouble-maker, or if he is simply "a nuisance," the supervisors can be observed to "tear into him."

The fact remains, however, that for the most part the supervisors are careful and cautious lest they have a grievance on their hands. Many of the supervisors have stated spontaneously at some time, "You can't be like the boss and get the work out of the boys on the line."

Supervisors' Morale. The picture presented of the supervisors' world might make us believe that no one would want to be a supervisor in this company. Conflict, tension, frustration, aggression seem prevalent. The question may be asked, "How do the supervisors feel about the situation—are they unhappy, do they dislike the Leader?"

The answer to this question is definitely *no.* As a matter of fact, the supervisors express admiration for the Leader. They believe he is an excellent administrator—"one of the best in the business," to quote a typical comment. While they realize that his leadership pattern cannot be used by them with the front-line employees, nevertheless they seem to feel the Leader must act the way he does. At times, some express resentment over the fact that the Leader may take their ideas and make them his own, but even these supervisors are quick to suggest that this may indeed be the test of a good administrator. An effective leader listens to ideas, picks the best ones, and puts them into action.

How can the supervisors have such an opinion of a leader who, from their point of view, places them in some very unhappy situations? In the next few pages, I shall attempt to outline several important explanations (still tentative, pending further controlled research).

Defense Mechanisms. The supervisors are unconscious of the effects the leadership pattern has upon them. They do not realize that many of their tensions arise from the leadership pattern and the plant conditions related to the pattern.

This does not mean that the supervisors are insensitive to the world around them. I am not implying that they are blind to the Leader's disadvantages. What I am suggesting is that these negative conditions have become so much a part of their world that they are unable to see clearly the causes for these conditions. This is not unusual. In fact, it is a technique frequently used by people to adapt to a negative situation.

All healthy personalities are able to adapt to negative conditions by a device known as a "defense mechanism." [3] Defense mechanisms are psychological processes which the person can use to defend his picture of himself. By putting them into action, the person (a) distorts reality in such a way that it does not affect him too seriously and (b) is able to "drain off" a lot of inner conflict, tension, and frustration rather unconsciously. Four of the most often used defense mechanisms found to be operating among the supervisors here are repression, rationalization, projection, and sublimation.

Repression. Briefly, repression is the forcing down into our unconscious of those conflicts, tensions, and frustrations (and usually their causes) that annoy us very much.

An indication that the supervisors repress their underlying tensions is

[3] Chris Argyris, *Personality Fundamentals for Administrators: An Introduction for the Layman* (New Haven, Yale Labor and Management Center, 1952), Chapter VI.

shown by the many times each has been recorded as stating he is "fed up" and wishes he could "get away for a few days." In this case the inner tensions that prevented expression are beginning to accumulate within, and the person feels "down and out."

Another indication of repressed feelings is the fact that some supervisors "blow up" at the slightest provocation. After they have "blown their top," they admit that they "can't see why they got so excited" and usually close the matter with, "Well, who cares, I feel better now." These men have less control over their deeper feelings than those who hold their feelings back until they become "tired" and "fed up"—and have to take a day off. They let the "breaking point" creep up on them to such a degree that even a "little" occurrence makes them explode. But the fact that they do not take as many days off shows that they have released their tensions.

An interesting by-product is that, since the majority of the supervisors repress rather than express their feelings, they tend to be cautious in their interaction with the "touchy fellows." Consequently, much direct and straightforward communication is inhibited.

Rationalization. Another often-used defense mechanism is rationalization. Rationalization occurs when we invent some excuse (acceptable to our own personality) to cover up our failure in a situation or to cover up our inability to accept something. For example, many supervisors remark, "Life is tough, but isn't that true all over?" or, "Such is life; this atomic age is going to send us all to hell." Thus the supervisors excuse their own conflicts and tensions by saying that this is the way life is.

As a result of these constant rationalizations, an interesting development takes place. Since tension is "natural," one begins to expect it. As a supervisor builds up more and more expectation of tension, the existing tension becomes seemingly less. This is true because his tolerance for tension is now higher. Thus, for a supervisor to sense as much tension as he is accustomed to, the existing tension would have to increase. Similarly, when people who expect to be disappointed are disappointed, the disappointment seems less than expected. Here is another reason why the tension in the plant is less noticeable to the supervisor than to an outsider.

Moreover, since tension is "natural," it no longer produces an urge on the part of the supervisors to want to change the situation. This resignation to tension naturally helps maintain the status quo—tension—and this leads to another rationalization relating to the necessity for strong leadership. Since the world is full of troubles, there is a need for strong leadership. Thus we have a situation where an acceptable reason for strong leadership arises from the tension and conflict which, in the first place, is partially created by that strong leadership!

Projection. The third defense mechanism is projection. By projection

I mean avoiding blame or ascribing responsibility to other persons or things, while ignoring one's own part in the problem.

Here, for example, many of the problems we have seen are projected on the salesmen; it is their fault that so many problems occur, since they are interested in only one thing—more sales. The production control and the cost and budget control people also receive a substantial part of the projection. Production control people, according to the supervisors, are always "bungling up the planning," while the budget and cost personnel are simply disliked people who have their "clutches of death" on all.[4]

Another factor blamed for all the supervisors' troubles is that some of the products they manufacture are custom-made and extremely complicated. Custom-made products, the supervisors explain, are extremely difficult, since the customers' personal idiosyncrasies and desires affect almost all the stages of production.

Sublimation. The fourth mechanism is sublimation. This occurs when the individual unconsciously channels his negative feelings into other forms of expression. These tensions are then permitted to return to the conscious self, but are now expressed in a different and usually more acceptable manner. Thus some of the supervisors give vent to their tensions by working extremely hard and trying to manifest aggressive and dominating leadership. Still others express the tension by being completely passive and withdrawn.

Those who adjust by taking on a more aggressive leadership pattern insist that the reason they are aggressive is because they "have to be or the work would never get done." They further insist that the employees are inherently lazy and only the supervisors really work hard on the job. No one, they continue, worries as much about the department as they do. (Note the similarity of this rationalization to the one used by the Leader as one of his reasons for the necessity of a "needling" leadership pattern.)

Those who adjust by becoming passive and withdrawn, on the other hand, tend to complain of the "damn tension in the business." Once this first feeling is expressed, they usually continue by complaining about "some of the apple polishers who run around hell-bent-for-election acting as if they run the whole outfit." Then they will admit confidentially that they are beginning to wonder if all this pressure really is necessary. In other words, they have become psychologically tired of the plant situation and have taken on a passive role simply to prevent it from affecting them further.

I ought to add that the existing interdepartmental "cold wars" also

[4] For a more detailed discussion of the human problem created by budgets see Chris Argyris, *Impact of Budgets on People* (New York, Controllership Foundation, 1951); or, in more condensed form, "Human Problems with Budgets," *Harvard Business Review,* January–February 1953, p. 97.

offer unusually good opportunity for the supervisors unconsciously to channel and express their negative feelings.

Built-in Dependency. The point is that somehow the supervisors are able to think very highly of their Leader. They admire him, emulate him, and unhesitantly admit that he is responsible for many of the improvements in the plant. Moreover, they are not glum; they do not go around with long faces; they do not continually gripe. Their plant, they proudly proclaim, is as good a place to work in as any they know of. If tension is great, or even damaging, they are not worried about it. They are doing a good job. Their plant has the best profit and efficiency record in the entire organization. There is little question in their minds but that, all things considered, "We're working in the best damn place in the world, under the greatest guy in the world."

Perhaps all modern industrial organizations based upon such principles as "unity of command" and "task specialization" automatically place subordinates in a dependency relationship with their leader. In other words, no matter what type of personality an administrator has, perhaps his subordinates would always feel a certain degree of dependence on him.

I am at the moment conducting new research in another organization and with another leader. This leader's pattern of leadership is quite different from the one discussed in this article. But the type of organization is the same. I find that subordinates there also report that they feel dependent on their leader and, even though they have learned to hide it from him, they feel leader-centered. Finally, they admit that there exists hostility, competition, and buck passing among themselves.

Because of the possibility (still not proved) that dependency of the subordinates toward an administrator may be a built-in feature of modern industrial organization generally, I would like to suggest that *part* of the dependence on the Leader that the supervisors feel here is created by the make-up of the organization. Certainly, as we have seen, the supervisors do not blame the Leader; in fact, all of them feel that the Leader's leadership pattern is inevitably the kind that is rewarded by management in general. Although they do not feel they can be as go-getting, needling, active, and energetic as the Leader, they *wish* they could. They definitely state that in their experience it is this type of leadership that will help them advance in the kind of world in which they work.

Conclusion

This article is based upon the study of one leader. I do not know, nor am I claiming, that this leadership pattern is typical of a substantial number of executives. But I do say that to the extent executive leadership in America is as we describe it, then it seems wise to ask ourselves some questions. In doing so, we must keep in mind that, by all conventional

efficiency standards, our Leader is extremely successful. A substantial share of the high profits, the low production errors, the low production waste, the high production efficiency, and the relatively low absenteeism may all be clearly attributed to him. He has created a financially healthy organization; he continues to maintain it that way.

These are the questions I would raise:

(1) Should we not be more careful in our insistence that subordinates show creativity, initiative, and individualism if the very make-up of the organization tends to lead them to experience dependence and submissiveness? Whom are we fooling when we *write* and *talk* about "creative management" as long as our employees *experience* a different state of affairs?

(2) What about the great emphasis on democratic or participative management? Can we really expect our subordinates to be spontaneously and freely participative in groups if, by the very nature of the situation in which we place them, they are led to be dependent and leader-centered?

(3) In view of the high morale and financially healthy organization that developed under our Leader, would the "milk-toast" human relations methods advocated by some writers have affected the same favorable situation? Does this mean it is preferable for administrators to be swift and to the point and sometimes even ruthless, rather than to be easy and considerate?

(4) Was the top executive right who one time told me that he picked his executives on the basis of ulcers (those who have them get the jobs; those who don't wait until they do)?

(5) What kind of organization and what kind of leadership do we need to minimize submission, dependence, and leader-centeredness and to maximize organizational growth and individual expression and creativity?

I certainly do not have the answers to these questions. I am uncertain about the questions themselves. But I do feel strongly that there is something basically tragic about the response these hardworking supervisors gave when they asked themselves whether they were "men or mice." They just laughed.

Part Ten: ORGANIZATIONAL BEHAVIOR

1. Size, Shape, and Function in Industrial Organizations *

Mason Haire

Introduction. There has been a great deal of discussion, in recent years, of the growth of very large business and of the problems that this makes for the national economy, as well as for the political and social organization of the country. There has also been some suggestion that this bigness in itself is evil, although the nature of the evil is never made very clear, nor is it clearly stated at what point in growth the size becomes bad. From the point of view of management's problem, there seems to be no necessary liability in simple size, but there are special problems connected with it, and it is well to look at the implications of growth in an industrial organization for its shape and function.

In the development of living organisms, size, shape, and function are very closely linked together; the problems of their interrelation have concerned a small group of biologists since D'Arcy Thompson first published his monumental *Growth and Form* in 1917.[1] Let us look at some of their speculations and consider what they may mean for an analysis of size in industrial organizations. It will pay us to examine the problem of growth and form in living organisms, keeping in mind the business organization as an analogous problem. Let us continue to ask: Do these principles apply, and how do they apply to the development of companies? It is quite possible that the relationship between the two sets of problems is more than merely an analogue; if it is possible to translate the structures and the forces, we may see something of the principles underlying social organizations. In any case, the analogy seems a stimulating one both for the industrial manager and for the social scientist.

Size, Shape, and Function in Living Organisms. Living organisms tend to be the shape they are because they are the size they are, and both

* Reprinted from *Human Organization,* 1955, 14 (1), 17–22, by permission of the author and of the Society for Applied Anthropology.

[1] D'Arcy Thompson, *Growth and Form,* Macmillan & Co., New York, 1942.

their size and shape are made possible by the way certain functions are performed within them. For instance, in considering the relation between size and shape, let us ask how big a man can be. The mythical monster whom Jack the Giant Killer met is pictured as being 60 feet tall and well proportioned. Thus, he is 10 times as tall as Jack, and also 10 times as broad and 10 times as thick through. His volume and mass are 1,000 times as great as Jack's, since he is 10 times as big in each dimension. However, since he is proportioned in much the same way that Jack is, we might expect his leg bones to be 10 times as broad across and 10 times as thick through, or the cross section of his bone to be a 100 times that of Jack's. This means that his weight, which has increased 1,000-fold, must be borne by supports which have increased only 100-fold. The human bone will barely support 10 times the weight that is normal, and consequently if the giant ever got up to pursue Jack, his legs would very likely break at the first step, being unable to support the additional weight that accrued when he changed his size so radically without having the foresight to change his shape appropriately. The poor giant is trapped by what is often called the square-cube law. As size increases, the mass grows according to a cube function [2] (since it increases in three dimensions), while the surface or cross-section only grows by a square function, increasing as it does in only two dimensions. This balance between mass and cross-section places a simple engineering limitation on the size of a man, unless he changes his shape to handle the increased load. We might ask similarly what a deer would look like if it were as large as a rhinoceros. The answer is that it very likely would look like a rhinoceros. It would have to give up its graceful legs and develop short stubby legs, angled out to support the tremendous increase in mass involved.

It seems clear from these examples that a certain shape only fits a particular size, and that the appropriate size may be rather narrowly limited and defined by rigorous physical laws. The same kind of thing is true in the relation between size and function. Particular ways of accomplishing certain functions are suited to one size, but are not at all appropriate as the size increases, and new solutions must be found. For example, a microscopic worm has a smooth skin, through which all the oxygen it needs soaks in directly. This system works well because the permeability of the tissues is sufficient to absorb oxygen, and the distance from front to back of the organism, or from head to toe is so small that

[2] This is why the Lilliputians had to feed Gulliver such tremendous amounts. When they had a half-pint to drink, they gave him 108 gallons. And quite rightly! They reasoned well that since he was 12 times their height, from the similarity of their bodies he would need 12^3 or 1,728 times as much as they, and 1,728 of their half-pints made a drink of 108 gallons. Their arithmetic was correct, even though their engineering principles may be strained by the disparity in size.

the oxygen can be diffused throughout all the tissues. Consider again, however, what happens when the organism increases 10-fold. The mass is now 10 times 10 times 10, or 1,000 times as big, but the surface is only 10 times 10, or 100 times increased. The skin can no longer absorb sufficient oxygen to supply the mass with its vital requirements. If it were to function it would have to absorb 10 times as much oxygen through every square inch to care for the new size, and the characteristics of the gas and the tissue do not permit this. The worm, like the giant, is brought up short by the inflexible square-cube law. The problem presented is how to increase the surface without running into the prohibitively expensive increase in mass which was the original stumbling block. As we look at other species we can see other solutions to the problem. Specialized folds of skin are pleated and wrinkled to provide a maximum of surface and a minimum of volume, so that the absorption can continue within the limitations of the permeability of the tissue, and still provide sufficient oxygen for the larger body. These specialized pleats are sometimes constructed in different ways and attached somewhat differently, but the function is the same. Whether they are called gills or lungs, their development is an attempt to meet the problems of increased size by modifying function appropriately.

We begin to see, by these examples, the close interrelation between size and shape and function. A particular shape limits the possible size; a particular function will only work well for a particular size and shape. As size increases the shape must be changed to meet the new forces implied, and the functions modified appropriately. It has been suggested that the study of morphology and comparative anatomy is a study of the problem of getting a shape that will fit the size that has grown, and of adapting functions to the shape and size. The survival of the species depends on the solution to these problems. The organisms who retain their original size survive because their shape and function remain appropriate. Those which grow much larger survive only if they develop at the same time new solutions to the problem of shape and function. Organisms which grow and attempt to retain their original shape and functions are eliminated through the blind evolutionary process of natural selection.

Size, Shape, and Function in Industrial Organization. When we look at the natural history of industrial organizations we see much the same thing. The size of companies varies through somewhat the same limits as the size of warm-blooded mammals. In history, many of them have grown through similar evolutionary processes, and there has been some of the same kind of elimination of inefficient solutions through natural selection. Organizations have similar interrelated demands on size and shape and function, and it seems wise to try to make these relations explicit, because in this case, unlike the development of organisms, we can plan in advance some of the changes that will come with growth, and thus eliminate cer-

tain forms which have little survival value. Instead of being at the mercy of blind evolutionary processes and a ruthless natural selection, we can, by understanding the implications of size for shape and function, avoid inefficient solutions, and direct the development of organizations with conscious planning toward rational ends.

If we think of an industry on the analogy of an organism, we see it embedded in a particular vital context. It must have a regular supply of raw materials and it can only afford to spend a certain amount of energy (or money) in acquiring them. It must transform these materials in much the same way as the body transforms food into energy, and to do this it requires a group of specialized functions. Within it, it must have a particular distribution of functions such as authority, control, communication, and skill. As it grows larger it makes new demands on its environment in terms of natural resources, labor requirements, and customers. Internally it also makes new demands. As the business grows, the old face-to-face techniques are no longer adequate. Just as the microscopic worm in growing requires lungs to absorb oxygen, so the company in growing may have to develop entirely new techniques to accomplish functions that were easily encompassed when it was smaller. In many cases these new techniques are not merely more of the same, but really involve things that are different in kind as well as in degree. Such things as the kinds of skill and the location of pools of skill within the organization, the decentralization of authority, and the development of new kinds of communication networks may change radically as the company grows.

Unfortunately, there is a great tendency, in human activity, to perpetuate solutions that were successful in the past, and to try to solve tomorrow's problems with the techniques that worked yesterday. For a specific example, this tendency is nowhere clearer than in the history of small restaurants all over the country. No business has as high a proportion of failures, and much of this seems to come from the problems of the interrelation of size and shape and function of the sort that we have just discussed. Typically, an enterprising man starts a diner. He is cook and counterman and cashier, as well as public relations man dealing with his customers. As he prospers he moves to a bigger place. Now he needs more people—separate individuals to be cook, counterman, cashier, and greeter. His success at this point demands two skills of him that were not required in his first endeavor. First, much of his future depends on a keen analysis by him of the nature of his business and of his own strengths and weaknesses, so that he can assign himself to the proper job in this more complicated organization. Secondly, he has taken on a new function that was not required in the original business. He is the boss. This requires a new skill—that of handling people, and of running his organization in such a way that the cook will cook as well as he himself cooked, the counterman will wait as well as he did, and the cashier be as honest

and careful as he was. Here the size implies a new shape and the size and shape a new function. This is the point at which the businesses typically fail, still in the flush of their first success, because it is impossible to make the transition to the new functions that are required by increased size. If it succeeds, the same kind of new problems will continue to be presented as the size increases and shape changes, requiring new functions. Now the boss must build an organization which will delegate such functions as the cashier-control job, the purchasing job, and the production responsibility; he will face technical problems in labor relations which he never knew before; he will have all the problems involved in maintaining a harmonious functioning group of subordinates. The persistence of his success through growth depends on his ability to meet very rapidly the changes in shape and function that are implied by the growth of his business. If he tends to apply to today's problems the techniques that were responsible for yesterday's success, he may be developing a form with no survival value. He must be maximally alive to changing requirements.

The example from a growing restaurant is not out of line with similar problems in other industries. In a large manufacturing industry such as the aircraft industry, fluctuations in the external environment require many and rapid changes in size. Often these changes come so fast that it is difficult to re-tailor the shape and function of the organization to meet them. In other areas, we all have seen businesses which hung on to a centralization of authority long after growth dictated its delegation, and that paid for this lack of adaptation of shape and function in terms of an organization which was very much less efficient than was possible. Similarly, many companies, as they grow, feel the need for new formal communications systems—for house organs, foremen's meetings, managerial conferences, and the like. Many large companies are beginning to realize the increased demand for a formal public relations program to maintain their contact with the environment in which they live. All of these are responses to the pressures of size and shape which must be met quickly and well for optimal effectiveness.

In many cases we may have to find solutions that are radically different. We may have to give up the old notion of an organization chart looking like a family tree, with the branches leading up to a single central trunk. It may be better to set up relatively autonomous organizations within the company which compete with one another, as has happened in the automobile industry and elsewhere. It may be necessary to re-examine the traditional assumptions about the span of control—the number of men one man can supervise—and radically alter them. Instead of 10 or 20 men reporting to an officer, we may need 50 or 75, as has happened in some places in retailing. Instead of relying on a suggestion box to provide upward communication about the organization, we may need to

consider more elaborate committees spreading across lines of authority. It is never safe to rely entirely on the solutions that worked before, depending on having more of the same to allow for greater size. To keep healthy organisms, as industry grows, we must be sensitive to the implications that size has for shape and function, and we must anticipate the possibility of entirely different solutions to managerial problems.

In the beginning, we raised the question concerning the harmful effects of size, and took the position that size, of itself, is not necessarily harmful. However, the appearance of size has a seductive quality in that it seems to arouse the feeling that a thing is strong and powerful *just because it is big.* This feeling is dangerous. It is not only not true, but it may well be exactly the opposite of the truth. Consider, for example, the construction of a bridge. As was the case in the example of Jack and the Giant, the strength of the bridge's girders will increase in proportion to the square of the girder's cross-sectional dimensions. Its weight, however, varies as the cube of its linear dimensions. If two bridges are built of the same shape—that is, geometrically similar—but one is bigger than the other, the larger bridge will be the weaker for just this reason. The strength of its members has not increased as fast as its own weight. To match the strength of the smaller bridge, the larger will have to increase the size of its girders much faster than the size of its length, for instance, and this will soon become prohibitive and impractical. The other alternative is to change the geometrical structure of the larger bridge, and gain increased strength from the new shape. The strength comes from the appropriateness of the shape to the size, not from the size alone. Similarly, the industrial colossus will break from its own weight if it tries to retain the original form and function, and its strength will come from the proper solution of the size-shape-function balance, rather than simply from sheer size.

One other implication of size needs to concern us here. In living organisms it seems clear that the larger the animal the more difficult job it has in adapting itself to sudden changes in the environment. The small animal seems to maintain an agility and flexibility, not only in moving, running, and jumping, but indeed, a similar flexibility in adapting to changed environmental conditions. Superficially, it is easy to see the same loss in flexibility in very large industrial organizations. The implications of size may be somewhat the same, and should be taken into account. Quoting an earlier writer, Thompson says,

> In proportion to the bulk of species is the difficulty of the contest which, as a living organized whole, the individual of each species has to maintain against the surrounding agencies that are ever tending to dissolve the vital bond, and subjugate the living matter to the ordinary chemical and physical forces. Any changes, therefore, in such external conditions as a species may have been originally adapted to exist in, will militate against the existence in

a degree proportional, perhaps in geometrical ratio, to the bulk of the species. If a dry season be greatly prolonged, the large mammal will suffer from the drought sooner than the small one; if any alteration of climate affects the quantity of vegetable food, the bulky Herbivore will be the first to feel the effects of stinted nourishment. (pp. 29–30).

A large size becomes cumbersome in almost any exigency. Perhaps we should contemplate large industrial organizations, considering their survival value, in their present form, in the face of radically changed environmental conditions.

Not all of the implications of size are liabilities. To return to the analogy of living organisms, one of the real advantages of size is that it is easier to keep a large organism warm than it is a small one. Some of the problems of function arise from the fact that volume increases faster than surface, and consequently the oxygen absorption of the skin becomes insufficient, or the bearing strength of bones is too little as size increases. The same fact, however, makes it easier to keep large bodies warm. Heat loss is proportional to skin surface, since the heat radiation is largely directly from the skin. The animal 10 times as big as his smaller neighbor has 1,000 times the volume to warm, but only 100 times the skin through which to lose heat. This means that he has to take in proportionately less food to survive, since the food provides fuel for warming. For example, a mouse eats about a quarter of its weight daily to supply itself with fuel. A human eats something on the order of one-seventieth. He has gained considerable in efficiency by gathering under one skin all of the volume he is trying to fuel. If a number of small animals were gathered together until the total weight was as much as a man's, their fuel requirement would be 15 or 20 times as much because of the inefficiency of their operation as separate organisms. Large industrial organizations are reaping the benefits of similar savings resulting from the operation of increased mass within a single skin. These benefits, too, must be recognized and exploited as fully as possible, to maximize the advantage of size. Properly used, they can provide the return for the difficulties that arise with new problems which accompany growth. Throughout periods of increasing and decreasing size, we need to be alert to the demands on shape and function, to anticipate new methods, and also to be alert to the benefits that are possible from the new size, to draw the fullest measure of return from them. The history of the development of living organisms is one in which a series of changes are made, and the most favorable of the changes survive. If we are to avoid this kind of blind evolutionary selection in industrial growth, we must take advantage of our understanding of the process to anticipate the requirements and implications of changes in size. There are no simple rules for doing this. The main requirement seems to be an increased sensitivity to the way the organization is presently functioning and the reasons for its success, to-

gether with a thoughtful appraisal of the demands that tomorrow's changes may put upon it.

Many present problems in management point to the demand for new functions occurring with changes in size and shape. Our national genius is for technological change. Usually this kind of change is paid for by large volume operations—by increased size. The re-skilling that accompanies technological change (to minimize the cost of turnover) and the growth of the organizations, have both pointed up a group of problems related to motivation and morale at work. The considerable current interest in "human relations in industry" is evidence of management's attempt to deal with this problem.

Both the fact of increased size and the kind of work implied by rationalized and engineered jobs have created new management problems which require a rethinking of the psychological bases of human behavior at work. There was an opportunity, 40 years ago, to anticipate these implications and to take them into account. By and large this opportunity was missed, and we are hurrying now to make up for the deficiency with a great deal of current interest in the area. To look elsewhere, the growth of large organizations has outrun the available supply of executive talent, and many companies are scrambling to institute executive development programs to correct the deficiency. Here we exhausted a resource without anticipating it, and without a careful program in advance to develop the material that is needed today.

Can we avoid this kind of thing in the future? Only to the extent that we can anticipate the implications of developments that seem certain to arise in industry. There is a growing interest in automation in industry. What will be the implications in terms of managerial techniques and personnel policy? As accounting machines take over more of the control function in banking operations, it will make it possible to change the duties of tellers so that their customer relations become more important. As automatic production techniques in manufacturing approach the production lines of the automobile industry or the dial-watching of the process industries, such as oil and paper, the size and character of the workforce will change, and with these changes will come changes in the problems of supervision and management. Finally, in the past we have typically reaped from technical change a benefit that has been largely paid off in terms of increased leisure time for the worker. In this way, changes within industry have altered the nature of the environment in which it is imbedded. If automation extends these same benefits we need to anticipate the implications they will have in terms of such diverse things as customer demand, the motivation of workers on the job, and the availability of a part-time labor force.

The rough shape of a good many other problems of this sort is discernible. Labor relations have certainly entered a new phase, in which the

concerns of labor and management will be very different. Labor is still making a transition from an organization geared to fighting for representation to one geared to a continuing relationship. Management is developing new skills in dealing with the changed relation. Increased social security at the governmental level, and the security of contractual pension and health benefits are both changing the motivational context in which everyone works. Even within the individuals themselves, changes are taking place. Medical advances are extending the life-span of the population so that we are living longer and longer. When this is coupled with the tendency toward early retirement, it means that we not only have a larger proportion of older people, but we may have a larger segment of nonproducing pure consumers in the population. These changes will have implications in the realm of economics, politics, and motivation. The rough general shape of these and many other changes can already be seen. To trim our organizations to fit them requires a good deal of thoughtful planning. It is perhaps too much to suggest that every company needs a Department of Philosophy to meditate on the future (although this is not an outlandish suggestion); but at least every manager, at whatever level he finds himself, should take as part of his job the setting aside of a certain amount of time to put his feet up and look out the window while he considers the nature of his job and his subordinates, and the changes that he may anticipate in them.

Implications of Size, Shape, and Function for the Social Scientist. In addition to the suggestive parallels between size, shape, and function in organisms and in organizations, there are a few somewhat more concrete threads that can be drawn which may have real promise for the social scientist's investigation of the nature of social organization. In discussing the form of animals, it becomes clear that the form is not accidental or arbitrary, but is what it is because of a number of definite and identifiable forces playing on it, and further that the form is prescribed closely within certain limits by these forces. In this sense, the form itself is an index of the kinds of forces playing on the organism, and the shape of the form is a first clue to the nature of the forces. Thompson says of this,

> The form, then, of any portion of matter, whether it be living or dead, and the changes of form which are apparent in its movements and in its growth, may in all cases alike be described as due to the action of force. In short, the form of an object is a "diagram of forces" in this sense, at least, that from it we can judge of or deduce the forces that are acting or have acted upon it: in this strict and particular sense, it is a diagram—in the case of a solid, of the forces which have been impressed upon it when its conformation was produced, together with those which enable it to retain its conformation . . . (p. 16).

If we could expand this principle to apply to social organizations, the form of the organization and the history of its changing form would pro-

vide an excellent beginning to the identification of the forces in which it exists, and the nature of their operation.

This approach finds some interesting applications in morphology which provide suggestive illustrations of the possibilities elsewhere. It often happens, for instance, that fossilized animals are discovered that have been radically distorted in shape under the very great shearing forces in the rocks in which they were imbedded. In order to reconstruct the original shape of the animal, it is necessary to correct these forces, and to push the organism back into shape, at least in theory. This process of "righting" the shape is indeed a process of returning to rectilinear coordinates a form which is presented to us on distorted coordinates. Let us assume that the horizontals on which our fossil appears are unchanged, but the verticals of the grid are oblique at an angle of 70 degrees. The transformation then, would be to straighten the vertical coordinates to 90 degrees, and to reproduce the fossil in the adjusted rectilinear system. However, suppose the problem were reversed. If we knew the proper form of the fossil and were given the distorted version, we could, by the discrepancy, infer the size and direction of the forces that must have been present to produce the distortion. If we had a time series of such fossils, distorted at different times, we could deduce quite a history of the forces which played on the rocks.

If instead of thinking of shearing forces in rocks acting on fossils, we think of environmental forces acting on the change in form on various animals, we have such a time series, and one by which we can make some inferences about the forces associated with changing form. For instance, if a porcupine fish (*Diodon*) is pictured on a set of simple rectilinear Cartesian coordinates, some transformations can be made. If the vertical coordinates are transformed into a system of concentric circles and the horizontal coordinates into a system of hyperbolas, with the pictured fish reproduced point for point and space by space, the new picture is not a senseless jumble or an impossible form, but a good representation of a closely allied, but very different looking sunfish (*orthagoriscus mola*). (See Thompson, pp. 1026–95). This transformation immediately suggests that we will have a foot in the door of understanding the evolutionary process if we can now identify the forces that acted on the fish in its development—what made circles of the verticals and hyperbolas of the horizontals in this form. Julian Huxley, in his *Problems in Relative Growth*,[3] has very much elaborated this analysis in an attempt to define growth gradients and growth centers in organisms. He points out (p. 104 et seq.) that this kind of transformation is not merely an exercise in higher geometry, but, biologically, the clue to the origin of very active growth-centers and to the fish's adaptation to life on the surface of the sea.

To apply this process to the matter at hand: Suppose we knew how to

[3] Julian Huxley, *Problems in Relative Growth*, Dial Press, New York, 1932.

draw a picture of an industrial organization. (We don't, but let us let that problem wait for a moment.) By tracing the history of a company through time we could see a series of changes whose regular nature would give us a clue to the kinds of forces playing on it. By comparing industries similar in size but different in process, product, resource, location, or age, we could, similarly, begin to infer from the systematic variation, the kinds of forces that are associated with these different conditions. A summary pictorial history, of, say, the process industries in comparison with the retail companies, would seem to promise an additional understanding of their natures and their differences.

Part of the rub here is that we don't know how to draw a picture of an industry. Certainly we do not want the old family-tree style of organization chart. Probably we don't even want that type of representation if the formal published description is corrected to agree with the way the plant really functions. We need something that will reflect the changes in size. That is not so hard. Probably some combination of numbers of people, investment per worker, gross volume, capitalization, and the like will do the job. Beyond this, we need something to define the shape. Where are the pools of skill and the pools of authority? What kind of internal bonds connect the parts in terms of authority? Of communication? What kind of specialized functions are there, and when did they develop, and what kind of relation do they have to other parts? How big was the company when a separate personnel function was established? Did it hire? Fire? Or merely record and plan vacation schedules? At what size did a control function emerge, and what has been the history of its duties, authority, and connection with other parts? Questions of this sort must be answered by our final picture. It must show the size, the shape, the components, and their relation to one another. It must have the functional meaning of the organization chart and the internal connectedness of the sociogram. At the moment we don't have such a picture, but there doesn't seem to be any necessary reason why we can't have one. It would seem to be simply an empirical matter of collecting variables and a creative job of putting them together tentatively time after time. It is a long task, but if it will lead to the evolutionary forces in the development of social organizations, it is well worth it. It could give us the first real understanding of the nature of the growth of groups.

There is one other asset which might be derived from such an analysis: We have spoken glibly, so far, of the forces that act on an industrial organization to change it, but we have no real understanding of what those forces are. In examining the morphological history of organisms it becomes perfectly clear that very different forces apply, and that they can be inferred from the problems of size and shape and function. For instance, in the case of animals of the general size of man, the chief external force is gravity. Gravity broke the giant's legs (in the form of

gravitational mass), and ultimately limited his size. In historical perspective, the sagging in human shapes is an eloquent witness to the force of gravity in determining form. Small insects are very little influenced by gravity. Their surface is so large in comparison with their mass that, for instance, in falling the frictional resistance is sufficient to protect them from the harm of the bump we receive under the influence of gravity. Such small insects, however, have their size and shape determined primarily (in external terms) by their problems with surface tension. The ratio of surface to volume which protected the insect in falling is a tremendous liability if he gets wet. Man's wet weight is imperceptibly more than dry; a fly's wet weight is double his dry weight. A form which will not break the surface tension is indispensable, and much of the shape and size is traceable to this. When we go still smaller, to the order of magnitude of the bacillus, the kinds of forces change again. Now the viscosity of liquids, molecular shocks of Brownian movement, and the electrical characteristics of the medium of growth and the relation between size and shape has given us a real lead to the primary forces in the environment in which the organism lives. One might hope, similarly, that an historical analysis of the growth of business, and a detailed understanding of the relation between size and shape and function in an industrial organization would give us a similar insight into the kinds of forces in its environment which shape its existence.

2. Adapting Organization to New Technology *

Frank J. Jasinski

Getting a new machine or production process to live up to advance expectations is often a hard job. Few are the companies that have not had frustrating experiences at one time or another in achieving the improvements that were *supposed* to come from a new line of automatic presses, or a more modern extrusion process, or a promising change in the conveyer system.

Invariably the question comes up: What went wrong? Sometimes, of course, the trouble is simply that the estimates in cost savings or productivity increases were too optimistic. Sometimes the engineering is

* Reprinted from the *Harvard Business Review*, 1959, **37**, 79–86, by permission of the author and of the Graduate School of Business Administration, Harvard University.

faulty. Sometimes the loss of a key supervisor, a strike, or a change in some other part of the plant is to blame. And sometimes the new technology is too hard on workers and supervisors, or threatens them in some way so that they resist it.

We are all familiar with such troubles. They are cited again and again. But there is another common type of difficulty—one that is rarely cited. It is a peculiarly *management* problem in that it both begins and ends with management, and no group *but* management can deal with it effectively.

Let me state this problem first in an abstract way; later we can go into detail and illustration. The idea is this: *a change in production or technology affects organizational relationships.* For example, a supervisor may find himself working with other supervisors and groups with whom he has had little contact before, or he may find himself reporting to different people, or different people reporting to him. *When management overlooks these social changes, it generally fails to realize the full potential of a change in technology,* however well thought out the innovation was from an engineering standpoint. The potential may then be achieved only after a difficult and costly period of readjustment. The duration of the readjustment period and the degree of technological potential finally attained depend, for the most part, upon management's awareness of the relationship between technology and organization and upon its ability to keep one in harmony with the other through changing times.

Management has established and maintains staffs of engineers who devote considerable time and effort to evaluating new plant sites, designing processes, and making meticulous plant layouts. In contrast, it makes only a nominal, if any, corresponding study of the organizational requirements of a new technological process. Rather, it usually tries to extend the existing organizational structure to the new process. And here is where much of the difficulty lies.

The Outmoded Vertical. Traditional business organization runs on a vertical line, relying almost solely on superior-subordinate relationships. Orders and instructions go down the line; reports and requests go up the line. But technology, including both integrated data processing and integrated machine production, has developed on what might be called a horizontal plane; that is, the machine cuts across superior-subordinate relationships, affecting the jobs of people in different areas, departments, and work groups. Superimposing a strictly vertical organization structure on a technology which emphasizes horizontal and diagonal relationships can and does cause obvious difficulties.

Typical of the kinds of relationships required by modern technology is the progressive fabricating and assembly line. Here the need to make the right decision or take the necessary action at the right time at the right place is immediate. Managers, in order to solve an immediate prob-

lem, have to deal horizontally with their peers and diagonally with people at different levels who are neither superiors nor subordinates. To follow established, formal routes would be too time-consuming, too costly, and too disruptive.

Necessary as these horizontal and diagonal relations may be to smooth functioning of the technology, or work flow, they are seldom defined or charted formally. Nonetheless, wherever or whenever modern technology does operate effectively, these relations exist, if only on a nonformal basis. In other words, certain individuals have developed their own techniques to work satisfactorily outside of (or in place of) the formal framework. They have usually done so after a period of trial and error and emerge as outstanding performers because they can deal effectively with equals, nonsubordinates, and nonsuperiors—undefined relationships which nevertheless are essential to the technology.

Certainly it is management's job not only to recognize these new kinds of relationships but also to take steps to enable them to function definitely and smoothly. A few managers have recognized the discrepancy between organization and technology, and have taken steps to integrate the two. They have achieved such integration in a variety of ways, which essentially may be classified as:

1. Changing the technology to conform with the existing organizational structure.
2. Changing the organization so as to define and formalize the relationships required by the technology.
3. Maintaining both the existing organization and the existing technology but introducing mechanisms to reduce or minimize the discrepancies between the two.

In appraising these steps we will want to look at the kinds of problems which arise when technology and organization are not integrated, and at specific examples of what can be and has been done to recognize and alleviate the basic causes of these problems.

Horizontal Relations. Let us start out by considering a technology which dramatizes the horizontal nature of the work flow—the automobile assembly line. I shall present the kinds of problems which can arise and the nonformal adjustments some members of management have made, as revealed by the Technology Project at Yale University.[1]

[1] For previous findings, see Charles R. Walker and Robert H. Guest, *The Man on the Assembly Line* (Cambridge, Harvard University Press, 1952); Charles R. Walker, Robert H. Guest, and Arthur N. Turner, *The Foreman on the Assembly Line* (Cambridge, Harvard University Press, 1956); also Walker and Guest, "The Man on the Assembly Line," HBR May–June 1952, p. 71; and Arthur N. Turner, "Management and the Assembly Line," HBR September–October 1955, p. 40.

Pressure for Short Cuts. The automobile assembly line winds its way, almost uninterruptedly, for several miles through the plant. The conveyer carries each automobile "without a stop" through five departments, past the areas of 10 general foremen, through the sections of 50 or 60 foremen, and past the work stations of thousands of workers.

When the "body" starts out, it is a flat sheet of metal comprising the car floor; at the end of the conveyer the car, now complete, is driven off into the test area. In between there are innumerable feeder lines or tributaries which bring parts to the main conveyer to be attached to the gradually evolving body. The entire plant and the efforts of all the employees are geared to the task of getting the right part to the right place at the right time.

There is, therefore, considerable interdependence both among production workers and between the production and nonproduction groups. The holes for a particular bit of chromium trim are drilled before the body is prepared for painting; the trim is attached a mile or so down the line. The piece of trim has to be on hand, brought there by a materials handler. And the tools of both driller and "attacher" have to operate at top efficiency—the responsibility of the maintenance man.

In other words, the foreman, to be effective, has to synchronize and coordinate the efforts of many individuals to achieve his production goals. He has to supervise the work of his direct subordinates; he has to make sure that parts are readily and continuously available; he has to ensure peak performance of all equipment in his area; he has to keep "tabs" on quality; and he has to track down and attempt to correct defective work done in previous sections which may be hampering his operators' work.

Yet, despite the importance of all these relations to smooth work flow, the organization does not define them formally. In fact, the formal relations are such that additional difficulties are introduced. For example:

> Although the workers report to the foreman and he, in turn, to the general foreman, others who are essential to the work flow do not. The materials handler reports up a separate and distinct vertical plane. So do the maintenance man and the inspector.
>
> Again, although production defects are within the line production organization, they may be caused by a foreman who reports to a different general foreman and sometimes even to a different superintendent.

Theoretically, the foreman can report any deficiency in services from supporting groups to his general foreman. This procedure is formally and clearly defined. Time on the assembly line, however, is crucial; cars pass a given work station at the rate of one every 1.5 minutes. Unless an error is corrected immediately, the consequences can be far-reaching. The foreman cannot afford to spend time hunting down the general foreman; he has to attend to the matters immediately and directly. To do so he has to

deal with other foremen (on the horizontal plane) and also with materials handlers, maintenance men, inspectors, and other foremen's workers (on the diagonal plane).

Readjustments Required. In view of the importance of horizontal and diagonal relations to assembly-line technology, the whole concept of superior-subordinate relations is out of place—at least, in much of the plant during much of the time. The formal boxes and directional arrows on the organization chart cannot set the tone for everyday activities. Unless this is recognized, problems can arise.[2] As one perceptive foreman commented: "When you deal with someone from another department, you have to show a smile."

Unfortunately, the Technology Project has revealed that many supervisors, accustomed to behaving according to the usual vertical channels, have not learned to relate effectively on a horizontal plane:

"In case I get stuff coming into my department that is wrong I usually let my general foreman know . . . and he goes over and gets it straightened out. I couldn't do that myself because, after all, I'm just another foreman."

"Actually, the job I'm doing now is that of a general foreman because I'm checking on these six foremen all the time. I've got the responsibility of letting them know that they're slipping up in one job or another, but I haven't got the authority to *tell* them to button up. Lots of times I have to go to my general foreman."

This lack of patterning and clarity in horizontal relationships frequently creates clashes between foremen. One worker provided this dramatic illustration:

"The foremen go around sticking files into one another's heads in front of the men. Just today we thought we were going to see a fist fight between our foreman and another one. They were screaming like washerwomen at one another. Fine example—they hate one another."

Hardly the way to get a job done! Yet these difficulties do not derive from personality clashes. Repeated reports of similar incidents throughout this particular plant strongly indicate a basic shortcoming on the part of the organization to adjust to the incoming technology.

Interestingly enough, there are a number of foremen who *have* been able to establish and maintain satisfactory nonformal relations with other foremen and with staff and service groups. This means spending much time with persons other than their immediate subordinates. Indeed, contrary to the traditional emphasis on the importance of the vertical foreman-worker relationships, the demands of technology are such that good foremen actually have to interact *most* of the time in horizontal and

[2] Frank J. Jasinski, "Foreman Relationships Outside the Work Group," *Personnel*, September 1956, pp. 130–136.

diagonal relations. As a matter of fact, the foremen judged most effective by their superiors are the very ones who spend the least amount of time with their own workers.

At the time of our study, management was not aware of the relations required by the work flow—or, at least, it had not done much to formalize those relations. In fact, the individual foremen making the necessary adjustments sometimes had to do so in violation of official policy.

Key to Success. Horizontal and diagonal relationships, such as those described, exist in virtually all business and industrial organizations.[3] A classic example involves a group of drill line operators in a factory who, even in the face of vigorous management disapproval, resisted the formal logics of an incentive system and continued to devise nonformal methods and relations for getting the work done.

There is no dearth of evidence to indicate that, whether or not the firm operates under the pressing immediacy of an automobile assembly line, the degree of production success depends in good measure upon the mutual adjustment or harmonious integration of the organizational structure and the technology. Where this integration is faulty, those individuals who are able to utilize satisfactorily the nonformal relations required are the successful ones. Where management has recognized the need for integration and has taken steps to achieve it, the efforts of individuals are made that much easier and more effective.

Having considered the kinds of conflict which can arise between the technology and the organization, let us now turn to examples of how some managers have effected a more satisfactory integration. As stated earlier, these methods are: changing the technology, changing the organization, and (less radically) introducing mechanisms to reduce discrepancies between organization and technology.

Changing the Technology. Ordinarily, managers consider technology to be inviolate. And frequently it is. After all, in making steel, for example, the metal has certain physical properties which require a certain timing and sequence of operations whether it is made in an American, Russian, or Indian mill. As a result, there are not many dramatic examples available of managers making changes in the technology to adapt it to the existing organizational structure. The illustrations that are available, however, should serve to make the point. For instance, though it is not generally thought of in these terms, the shift from process to product layout in industry is a fairly widespread technique for effecting just such a change. Most of the integrated machine-processing units would fall into this category.

One-man Supervision. Formerly, under the process layout, the manu-

[3] See William F. Whyte, *Money and Motivation* (New York, Harper & Brothers, 1955), pp. 53–66, and "Economic Incentives and Human Relations," HBR March–April 1952, p. 73.

factured item would go from the rough turning or lathe department to the mill and drill department, to the heat treat department, back to the grinding department, and so on until it finally went to the assembly department—with a different foreman in charge of each department. That is why there are so many meetings in such industrial organizations trying to pin down responsibility for schedule delays and errors in manufacturing.

It is true that, where volume warrants such a change, reorganizing the technology into a product layout brings about considerable savings in materials handling. This is usually the reason given for such a change. The product is no longer shunted between departments but goes uninterruptedly down a single line.

Yet the product layout conforms to the traditional organizational structure, and a number of managers have utilized it for that reason. With the product layout, one man, whether a foreman or superintendent, is responsible for the entire product. He has control over rough turning, mill and drill, heat treat, grinding, and even assembly. The operators who perform these diverse operations all report to him—in an established, clearly defined superior-subordinate relationship. Integration between organization and technology is thus achieved.

This kind of integration is possible only when the product can be made by the number of employees reporting to a specific foreman. When more workers are required, and two, three, or even more foremen are involved, closely knit integration becomes difficult.

As automatic equipment takes over more and more operations and as the actual number of employees is reduced, the number of products which can be manufactured in a product layout supervised by one foreman will increase. However, most industrial products, for one reason or another, still do not lend themselves to "one-foreman product layout" integration. In such instances, managers need to rely on one of the other methods to be discussed here.

Changing the Organization. The impact of recent technological innovations has forced many managers to take a second look at their organization, particularly with the advent of modern data-processing equipment. This equipment requires information in a certain form. Where managers have used it as more than simply a change in "hardware," the equipment has triggered sweeping revisions of data-processing departments. To prepare information efficiently for the processing equipment, managers have completely reorganized traditional departments. In this connection there are the telling, though perhaps exaggerated, stories of companies that revised their organizations in anticipation of delivery of data-processing equipment only to realize such great savings through the reorganization process itself that they canceled their orders for the equipment.

Successful Solutions. Charles R. Walker in his book, *Toward the Automatic Factory,*[4] describes one instance of conflict between the new technology and the existing formal organization and how that conflict was finally resolved:

A $40 million installation of a semiautomatic seamless tube mill failed to meet engineers' production estimates for nearly three years. There were a number of variables that were responsible for this delay, and most of them could be termed human factors.

Among these variables was the fact that the amount of production was pretty much regulated by the automatic machinery. An important variable in the level of production was "downtime"—the length of time it took to make a repair or a mill changeover for a different size of product. As with most industrial organizations, those interruptions of production involved "nonproduction" personnel: crane operators, maintenance men, and repairmen. Most of these nonproduction men did not report to line management directly; they reported vertically along separate lines of authority. Further, while the men on the mill crew were paid for what they produced by an incentive plan, the crane operators and maintenance men were paid on day rates.

In other words, though the technology required the mill crew, the crane operators, and the maintenance men to work as a cohesive unit, management through its formal organization and its incentive plan treated them as separate entities, even to the extent of paying them differently. Productivity suffered as a result.

It was not until the workers convinced management (and the union, as a matter of fact) that the incentive plan should be extended to cover the entire work group—as required by the technology of the semiautomatic steel mill—that productivity increased. Following this and other changes, production not only met the engineers' original estimates of capacity but far exceeded them.

Had management recognized the new organizational structure required and made the necessary adjustments at the outset, then much of the three-year period of costly adjustment might have been avoided.

Undoubtedly, other managers have had similar experiences as one of the consequences of rapid technological innovation. Some may have recognized the nature of the problem and acted to alleviate it. Others may have simply let it ride. It is quite possible for a plant to function for quite some time with a conflict between its organization and the technology—but at less than optimal efficiency. It is also possible for such a plant to benefit from integration even after a lengthy period of such conflict.

A case in point is A. K. Rice's now famous Indian weaving-shed study:

Organization and technology had been firmly established for a long time. As in the steel mill, the weaving technology required a high degree of co-

[4] New Haven, Yale University Press, 1957, pp. 126–142; see also Walker's "Life in the Automatic Factory," HBR January–February 1958, p. 111.

ordination between the weavers and a variety of service people—especially during a change of cloth, a break in the yarn, and the loading and unloading of the loom. But the representatives from the servicing units who worked with a particular weaver varied considerably from one group activity to the next. The groups lacked uniformity and continuity over time. There was confusion as to who reported to whom and who had authority over whom. This, and the lack of group continuity, resulted in inefficiencies as well as high damage in production.

Then changes in the organization were introduced so that it would conform more closely with the technological requirements. For example, small work groups were created, with internal leadership, which existed as a unit over time and so were better able to cope with technological requirements satisfactorily. As a result, efficiency jumped 10% and damage dropped 7%.[5]

Temporary Measures. Obviously, the dramatic and thorough revisions described above are not always feasible or practical in modern business and industry. But managers frequently have made smaller organizational changes that border on being mechanisms. They can be of a temporary or quasi-official nature, or permanently incorporated.

Such temporary measures include coordinators or project heads who provide an organizational short circuit for the duration of a crash program. Best known, perhaps, are the temporary realignments during World War II in invasion task forces. Just prior to and during the invasion one man headed all participating service units. Following the successful completion of the invasion, the task force regrouped into separate and independent units reporting along individual service lines.

In industry, similar groups or teams are temporarily formed to carry out a specified purpose. Many engineering research departments function on a project team basis permanently. Another kind of quasi-official organizational change is the use of an expediter, who, unlike the coordinator or project head, has no direct authority over the individuals with whom he relates.

Still another kind of organizational measure, widely used to cope with horizontal relations, is the meeting. This form enables representatives from the several departments to raise, discuss, and resolve problems requiring the joint efforts of two or more department heads attending the meeting. Here again, the traditional and time-consuming formal channel is bypassed. Usually interdepartmental or interdivisional meetings are held at a top-management level; their usefulness or necessity at lower levels has yet to be fully explored by many organizations.

Other managers have found it expedient to include functions which

[5] "Productivity and Social Organization in an Indian Weaving Shed," *Human Relations,* November 1953, p. 297; see also a subsequent report, "The Experimental Reorganization of Non-automatic Weaving in an Indian Mill," *Human Relations,* August 1955, p. 199.

have been traditionally staff responsibilities under production personnel control. For instance, in an aircraft engine company on the East coast, management transferred its "tool trouble" groups from the master mechanic's department to production and created a new job classification (with quality control functions) under each production foreman.

In fact, considerable attention is currently being given by several large corporations to the question of how many of the service functions can be handed over to the foreman. This is an attempt, it would seem, to fall back on the well-established vertical, superior-subordinate relationships and thus avoid the nebulous and consequently difficult line-staff relationships. The limitations described previously in discussing the product-layout plan, however, would apply equally in this instance. The product must be one that requires no more individuals—machine operators and the transferred service personnel—than a foreman can adequately supervise or manage.

Introducing Mechanisms. Still other managers faced with a discrepancy between technology and organizational structure have attempted to solve the dilemma by changing neither technology nor organization but by introducing new mechanisms. In this case, we are not concerned with minor organizational moves such as have been described in the preceding section, but with procedures or routines.

A dramatic example taken from the restaurant industry of the introduction of a mechanism is provided by William F. Whyte.[6] The problem confronting him was a simple but vexing one:

> Viewing the situation *in formal organizational terms,* the waitresses reported vertically to the hostess; the counterman reported along another vertical line of "command" to the kitchen supervisor. Although not explicit, there was some indication that the countermen considered themselves at a higher organizational level than the waitresses. But *technologically* the work flow was from the customer to the waitress to the counterman. This ran against the formal organization. Not only was the relationship between waitress and counterman formally undefined; it also went diagonally, from a lower to a higher level.

In the cases cited by Whyte, a few individuals were able to adjust to this nonformal relationship, but they emerged as exceptions to the usual conflict pattern. Unfortunately, management did not recognize and take advantage of this adjustment and formalize these effective nonformal relationships in order to extend them to others in the organization.

Recognizing the conflict, Whyte introduced a mechanism to reduce it:

> As an experiment, one waitress wrote out her orders and placed them on a spindle. Her orders were always ready before those of other waitresses who

[6] *Human Relations in the Restaurant Industry* (New York, McGraw-Hill Book Company, Inc., 1948), Chapter 6.

had called theirs in at the same time. If she was not ready for a hot food order, the counterman would voluntarily place it in the warmer for her. Furthermore, he took a liking to her and made a bet with the bartender that she, like himself, was of Polish extraction—which she was not.[7]

Thus, an uncomplicated mechanism reduced the conflict between the technological work flow and the organizational setup without changing either.

Other Illustrations. The use of paper work as a mechanism to reduce possible conflict in formally undefined relationships is a commonplace in industry. Requests from production foremen, for example, go regularly to personnel, engineering, accounting, and other staff and service groups. Such requests cut across the formal organization both horizontally and diagonally. Conversely, reports may also cut across the organization through the "copy to . . ." technique while going up the line vertically.

Very often, the amount and type of paper work (copies of requests and reports) do not correspond to actual need. Many are destined to end up in the "circular file" simply because the paper work routes do not follow the lines required by the technology. (Machine accountants, aware of this discrepancy and pressed for tabulating time, occasionally run a check on the use made of various reports; they purposely delay circulation of a report for a few days or a week to see how many people will actually call for it. Thus they have been able, unofficially, to eliminate a number of outdated reports.)

The automobile assembly line provides additional illustrations of mechanisms employed by management to meet technologically required horizontal and diagonal relations:

An operator who hangs doors is in direct contact with the operator who puts them in proper sequence on the overhead conveyer. In the event of a misscheduled door, the line operator has a "squawk" box through which he can call for a substitute door. Here we have a horizontal relationship between two hourly operators, one in production and one in material control.

The worker who loads the overhead conveyer is guided in turn in his door scheduling by the "telautograph," which transmits information from an earlier point on the line from another hourly operator in the material control department. This operator notes the sequence of models and body types of cars passing his station on the line. The information is transmitted simultaneously to various schedulers in the plant who have to synchronize their operations with this sequence.

In the event of a mechanical or tool breakdown, time is especially important. When a line worker cannot perform his operation because of such a breakdown, he immediately signals for help through a whistle system: he uses one signal for a mechanical breakdown, another for an electrical one. The appropriate repairman (who is stationed nearby) comes over to repair the defect with a minimum of delay. For a worker to stop the line until he finds his fore-

[7] Ibid., p. 69.

man to report the breakdown in the traditional vertical plane would be absurd.

Several managements have adopted programs to facilitate nonformal relations. These range from company-wide social affairs, such as picnics, banquets, or sports teams, to a systematic rotation program whereby individuals at supervisory and middle-management levels transfer periodically from one department to another. Ostensibly, the purpose of such a program is to "broaden" the experience of the individual; actually the more important by-product is that it establishes friendships horizontally and diagonally, and thus encourages and facilitates nonformal relations required by the work flow.

Although many of these and other mechanisms can be effective and may, indeed, be the only means to reduce a discrepancy between technology and organization, it still is worthwhile to make broader and more basic changes in either the technology or the organization.

Conclusion

Frequently, the traditional, formally defined vertical relations in business and industrial organization prove inadequate to cope with modern technology. New technologies require new organizational setups, and it is being found increasingly that industrial processes require horizontal and diagonal relations which are not patterned or clearly defined.

Such lack of clarity can impair the production process. The work flow can create difficulty where the vertical lines are strongly emphasized and where the flow violates those lines—as was the case in the restaurant example cited. But when the formal organization is permissive, nonformal relations in the horizontal and diagonal planes arise to cope with the technological process. We saw that the more successful assembly-line foremen learned to relate with other foremen and their workers. But these relationships were not usually recognized formally; they existed on an individual and nonformal basis.

Management can work toward an integration between technology and organization in several ways: (1) by changing the technology, (2) by changing the organization, and (3) by introducing mechanisms. All these methods have been used effectively to some degree, but the difficulty occurs in that management's attempts toward integration generally lack a systematic and purposeful approach. They may just happen over time, arise as temporary expedients, or emerge as a solution to a crisis situation. Many managers have yet to explore the deeper relation between technology and the organization.

The advent of electronic data processing and integrated machine processing has forced some managers to reorganize departments to meet technological needs. Many such revisions, however, are limited to a small portion of the organization, to the areas of greatest immediate pressure. Cannot more be done? The case studies cited, as well as the successful

partial steps taken by businessmen and industrialists thus far, indicate a need for a systematic analysis of technology and organization. This analysis might include the following steps:

1. Examine the work flow of the technology to determine what relations are required.
2. Identify the points where the formal organization meets these requirements and where it does not.
3. Discover what nonformal relationships exist at present to meet the technologically required relations which are not encompassed by the formal organization.
4. Determine what formalization does exist to cope with relations falling beyond the traditional vertical planes.
5. Decide which of the nonformal relations might be profitably formalized.
6. Provide measures to facilitate the nonformal relations which are still required but which may best remain nonformal.

It will not be possible to formalize through new mechanisms or through technology and organization changes all of the nonformal relations required by the work flow. It should be possible, however, to remove or reduce the *major* points of variance between the technology and the organization. It makes sense for a company that has been farsighted enough to bring in a new technology to be equally farsighted in recognizing that established organizational patterns will not usually serve with the same effectiveness as they once did. If the new technology is to live up to production expectations, then management must see to it that organization relationships are carefully restudied and wisely redirected.

3. The Scanlon Plan: Some Organizational Problems *

George Strauss
Leonard R. Sayles

For the student of industrial relations, the Scanlon Plan is one of the most promising approaches yet suggested to the problems of obtaining industrial peace and higher production.[1]

* Reprinted from *Human Organization,* Fall 1957, 15–22, by permission of the authors and the Society for Applied Anthropology.

[1] See bibliography at end of article.

For the general student of organization, the Scanlon Plan is a unique attempt to solve some of the more difficult problems of applying democratic leadership to large organizations. To date most of our thinking and research in the areas of "participation" and "consultative management" have concerned relationships within individual face-to-face groups. We have ignored the very serious problems which arise when an effort is made to go one step further and extend participation over an entire organization. This involves having many face-to-face groups work together for a common goal while maintaining their internal democracy.

To put it another way: any organization faces the problem of establishing symbols to which members will react, but most organizations have different symbols for different groups and the symbols themselves often represent the human relations conflicts we observe. The Scanlon Plan represents an attempt to get people at different levels to accept the same goals and respond to the same symbols.

The material written to date has been concerned primarily with describing what happens when the Plan is a success. In this article we review the areas of tension which are likely to reduce the Plan's effectiveness with the hope that fuller understanding may lead towards their elimination.

The authors have engaged in fragmentary field studies in two situations of union-management cooperation. However, this article will be based primarily on an analysis of the literature.

How the Plan Works. Basically the Scanlon Plan consists of (1) a wage formula and (2) a system for processing suggestions and putting them into effect.

The wage formula is designed to distribute the gains of increased productivity proportionally among all employees involved. Although each formula is tailor-made to the needs of the particular company, typically wages are tied to the sales value of goods produced, so that, for example, for every 1% increase in productivity, there is a 1% increase in wages (and salaries). In contrast to usual production-incentive plans, bonuses are paid to the clerical force, salesmen, supervisors and sometimes even top management.

It will be noted that this is really a form of group piecework, covering the entire plant. The bonus is valuable not only as an incentive to productivity, but as a form of feedback or measuring stick by which the success of cooperation can be measured by the participants themselves.[2]

Thus, the Plan provides economic motivation, which is essential in our free enterprise society. Perhaps more important it sets up a system by

[2] In one situation we were particularly impressed by workers' interest in a PEP (Production Efficiency Plan) "thermometer" placed in the cafeteria which showed production to date and the amount required to obtain different levels of bonus.

which employees can participate in making decisions as to how they work.

The key to this is a new form of *suggestion system.* The mechanics are simple: In each department a union production committeeman is elected or appointed by union officers. He and the foreman constitute a departmental *Production Committee* which meets periodically to discuss suggestions made by individual employees as well as to formulate general plans for the improvement of productivity. Suggestions which they turn down or which affect the plant as a whole are referred to a plant-wide *Screening Committee,* which includes top management as well as the leadership of the union.

This differs from the typical suggestion system in a number of ways. Instead of an individual reward for an accepted suggestion, the group gains as a whole through a higher bonus whenever productivity is increased. The union takes an active part, rather than worrying about a speedup. Individuals cooperate with each other in developing suggestions instead of keeping ideas to themselves. Furthermore, when the Plan is most successful, management doesn't passively wait for the union to bring suggestions to it, but itself brings up problems for mutual discussion.

The suggestion system may be likened to an enlarged grievance procedure under which the union may initiate for management in a very broad area. The written suggestion is in many ways similar to the written grievance, the Production Committeeman corresponds roughly to the steward, and the meetings of the Screening Committee are somewhat equivalent to third-stage negotiations between management and the Local-wide Grievance Committee. However, the suggestion system relates to every phase of the production task—not just to complaints about contract violations.

This suggestion system is the communications scheme which makes the Plan work. Narrowly conceived, it is merely a formalized means of considering worker proposals for technological change. More broadly viewed, it should result in an unleashing of hidden ideas and energies and a transformation of the factory from a system of bureaucratic-hierarchical control to a system of democratic teamwork and cooperation.

In most of the situations reported, cooperation has brought significant gains for everyone involved. Large numbers of suggestions are made and most of these can be put into effect. Production and wages have increased as much as 50%. Resistance to change drops. Grievances between union and management often almost disappear. A real feeling of teamwork develops between workers and management. At best, there is union and worker participation at every stage of production planning.

Such, then, is the overall picture when the Plan is a success. But what type of social organization is required to achieve this success and how can such organization be obtained? In the sections which follow we propose to raise some critical questions about the effectiveness of suggestion

systems as a means of communication and the impact of the Plan on union and management as organizations as well as on the relations among their respective subdivisions. Our knowledge is too limited to draw conclusions; the chief function of this article is to stimulate further inquiry.[3]

The Interaction Pattern Required. Our general point of view is this: a successful Scanlon Plan requires tremendously increased interaction among all levels of union and management as well as major shifts in the pattern this interaction takes. Further, such interaction should be balanced and include all segments of the plant community. Where balance in the number and direction of interactions is not maintained, serious sources of instability arise which may eventually cause the program to fail.

Let's examine three examples of imbalance:

1. Excessive Pressure on the Union. Often the union consents to union-management cooperation only because the company's adverse economic position requires greater productivity and increased work loads.[4]

The union's cooperation consists of a) explaining and passing on information about changes introduced by management (and by implication rejecting in advance any grievance against them), b) negotiating changes in contractual provisions which hinder production, and c) pressing workers to work harder (this will be discussed later).

To the extent that such initiation by management is not balanced by comparable initiation by the union, severe stresses are created within the union. Members grow antagonistic to a union which appears to be but a branch of management. These feelings can be partially offset but not completely reduced if the union officers do a good job explaining to their members why the changes are being made. Yet, as the Pequot Mills case indicates, even if the union accepts cooperation in order to avert economic disaster, unless the members can express themselves and initiate for management, cooperation will not be accepted for long.

2. Excessive Pressure on Management. In one situation we studied, management was the party which seemed to be getting the brunt of the pressure. The union officers used the plan as a means of expressing their dissatisfaction with management's inefficiency and of seeking to obtain improvements. The union president said, "[The Plan] gives us a chance

[3] There are a number of important questions which we will not consider here. Among these are: whether cooperation and enthusiasm for the Plan can be maintained over long periods of time and through all phases of the business cycle, whether it can be equally successful under all sorts of labor and product market conditions, and the impact of the presence or absence of industry-wide wage patterns.

[4] The Pequot Mills Case is a classic example of this—as to a lesser extent is the well-known Union Management Cooperation in the clothing industry in the 1920's. Of course neither were Scanlon Plans (Slichter, 1941); (Chapple, 1944).

to get things off our chest. We've made a lot of company officers feel small."

If this is carried too far, Screening Committee meetings become devoted primarily to criticisms by the union of management. In situations we have observed, such complaints ranged from "there are too many engineers here; they eat up all the bonus" and "the scheduling department is all loused up; we can't get production out" to "why doesn't management get some more fire extinguishers?" All of these have the same feeling-tone as a typical grievance and some could have been handled as grievances even without the Scanlon Plan.

Where union suggestions are almost entirely critical, it requires unusual maturity on the part of management not to become defensive and reply in kind. Indeed, Screening Committee meetings may resemble those of the Grievance Committee under Armed Truce [5] that is, individual suggestions are discussed not in terms of their merits but as symbols of the power relationship. In such circumstances, management may reject suggestions merely as a face-saving device.

At first, increased union initiation on management may lead to increased membership initiation on their union and greater activity in all phases in union life. However, as management becomes increasingly resistant to the union, the members themselves may become disillusioned.

3. *Top Union and Top Management Alone Involved.* There is real danger that cooperation may involve top union and top management alone. In such a case little effort is made to communicate with union members or lower management. The union Screening Committee members act in a "representative" rather than "delegate" role (following terminology used by Jacques, 1951, pp. 179–184). Their commitments do not bind their members. They make little effort to forestall grievances or to sell their point of view to the rank and file. Management uses the union primarily as a sounding board to test union sentiment.

We would expect Screening Committee meetings to be devoted to highly general and abstract discussions of production problems or of specific issues of only secondary importance such as cafeterias, washrooms, wash-up time, etc. The level of expectation of what the Committee would accomplish would be low. Deep-seated problems would be avoided. Few suggestions of any value would be made by rank-and-file members. (This seems to be pretty generally the British experience with Joint Consultative Committees, see Scott, 1952.) Also, as Committee members become more and more familiar with overall plant problems, they may also become more closely identified with the management point of view and more distant from the rank and file.

[5] The term *Armed Truce,* used by Harbison and Coleman (1952) refers to the early stages of union-management relationships in which neither party trusts the other and both sides are preparing for further struggle.

With this introduction, let us consider more specifically the impact of the Plan on various segments of the plant community—paying particular attention to the suggestion system.

In our studies of the grievance procedure we found that the formal channels laid down in the contract are often disregarded. In their place a number of informal channels develop, some of which bypass the lower levels. The procedure as a whole operated differently depending on whether overall relations were good or bad, whether the foreman had autonomy, etc. We would expect the same kind of flexibility to occur in the suggestion system.

Impact on the Union. What happens to the union under cooperation? Does it dwindle completely away, as some members fear? Does it now approach all problems with a new feeling of reasonableness, even those which have direct relationship to increasing production—as management hopes? Or are normal collective bargaining functions completely unaffected—as is claimed by union protagonists for the Plan?

If union-management relations have been relatively harmonious prior to the introduction of the Plan, the amount of adjustment required by the union may not be very great. Under such circumstances, grievances have normally been discussed in terms of problem-solving rather than power positions, and management at times has initiated for the union. With the introduction of the Plan, a much broader range of problems is handled, but in practically the same manner.

However, our studies in non-Scanlon situations suggest that as relations between union and management improve, there is some tendency for officers to withdraw from the members and for participation to decline.[6] This may happen under the Scanlon Plan as well. The officers may become so involved in management policy that they are disinclined to push grievances which in many cases attack their own position.[7]

A top company officer of one of the most publicized cases of union-management cooperation reports that each year he grows more concerned that the union is losing its effectiveness. He is worried about the union's failure to process legitimate grievances and its leaders' excessive willingness to share responsibility for unpleasant work load increases and incentive rate cuts. He feels that the union can no longer provide a two-way channel of communication to the worker. For as the union changes its role in the plant, it also sacrifices its ability adequately to commit the membership and to alert management to sore spots in the organization.

[6] Cf. Sayles and Strauss, 1953, ch. 3.

[7] Slichter commented on Pequot Mills: "Union-management cooperation turned out to be a process by which the leaders gained such a thorough appreciation of the problems of the company, that proposals which seemed quite unreasonable to the rank and file seemed reasonable to the leaders" (1941, p. 559).

Under such circumstances grievances may take on an almost anti-union character. Wildcat strikes and other forms of self-help activity may be the members' form of protest.

Relevant to this is the role of the union in applying pressure to slack individuals and departments. These were our findings in one case:

> Most officers stated that since the main cause of low production was management inefficiency (for instance, poor scheduling), harder work by individuals would not accomplish very much.
>
> Still they felt a considerable amount of responsibility for the Plan and were concerned that a large number of people hadn't made an effort. As one officer said, "Those fellows just can't get it through their heads they should work harder." Several officers made pleas to the members at union meetings. For instance, one encouraged people to get to work on time because "All this lateness hurts our Scanlon earnings."
>
> In answer to our questions as to whether they would speak to individuals, one said, "Well, you have to be very careful if you do that." (Implying that under circumstances this might be done.) Another said, "This is pretty delicate and you have to be very careful how you do it. But after all, a guy is getting paid to do a job. You can go over and perhaps get away with it [asking him to work harder] without being considered a bastard."

In general we would think the role of the officers to be one of ambivalence and conflict. Though they have been more closely involved in the development of the Plan than the rank and file, they realize that in pushing for higher production they run against long established group standards and jeopardize their political position. Also, traditionally their role has been perceived, both by themselves and the membership, as one of fighting rather than cooperation with management.

If the officers are to be successful in changing standards, they must involve the rank-and-file members in the discussions of Scanlon Plan problems. They must exercise substantial skills in human relations—and if possible be themselves informal leaders. Yet our studies with local unions suggest that union officers frequently are not informal leaders.[8] Further, we would expect the type of individual who would be interested in the technical problems discussed by a Plan committee to be less likely to have the skill in consulting with his men than the informal leader. If this consultation is not carried on, the members may feel under pressure rather than having a sense of participation in the system.

Another question concerns the traditional union functions of collective bargaining and grievance procedure. Joe Scanlon insisted that these should be entirely separate from the Plan and to insure this, he required

[8] The Local president in one situation we studied explained the complicated indirect method of electing committee members on the grounds "We don't want this to become a popularity contest." In other words, he was looking for what we call "administrators," not "informal leaders" (Sayles and Strauss, 1953).

that union stewards and officers (except for the Local president) be excluded from positions on the Production or Screening Committees.

In doing this the union makes a gallant effort to divide itself in half, part maintaining the traditional structure of the local union and the rest fully devoted to cooperative endeavors. The theory is that neither is to intrude on the other. Yet research shows that in non-Scanlon but cooperative relations there is a constant tendency to discuss matters which are not grievances within the strict meaning of the term. It seems impossible to have a sharp separation. This same tendency is observed in the Scanlon situation.

When an attempt is made to separate grievances from suggestions there naturally arises competition between union functionaries handling each type of communication.

In one Local we studied it was agreed that the Screening Committee was "the most important committee we have" and union officers faced a dilemma as to whether to keep their office or to run for a position on one of the Scanlon Committees. The effect was to divide the officers into politically rival groups. The union leader of the Screening Committee was charged with being "more for the Scanlon Plan than the union." A big issue related to whether night foremen should be allowed to relieve men on the machines. The Plan committeemen defended this, since it would increase production. Their opponents opposed on the traditional union grounds that management should not be allowed to do productive work.

There was some evidence that the remaining officers felt somewhat left out of things and were prone to push traditional anti-company grievances as a means of protecting their status. Many of the officers and active union members not connected with the Plan 1) criticized the Plan committee members for not showing greater militancy in unmasking management's incompetence, and 2) were dubious of the Plan's success. The Plan's committeemen defended themselves by arguing 1) that they had in fact exposed this incompetence, and 2) that the Plan was more of a success than its opponents were willing to concede. (In a way, this forced them alternately to attack and defend management.)

One area of controversy was whether the Plan could be discussed at meetings at all. During the first meeting attended there was some effort by Plan committeemen to prevent any discussion whatsoever. Later the unofficial committee spokesman tried to limit discussion to general policy and to avoid consideration of specific suggestions. Regardless of his efforts, a great deal of time was spent in griping about management inefficiency. Further, there seemed to be something of a competition among Plan committeemen to see who could report greater militancy.

Thus the efforts of the Scanlon Plan committee to keep the meeting from discussing suggestions correspond very closely to that by the Grievance Committee in other locals to keep grievances out of the membership meetings. In both cases the committees fought a losing battle.

Where cooperation is more successful, we would expect union meetings

to be less concerned with complaints against management and more with a realistic discussion of production problems. Still it seems to us totally impractical to try to separate the Scanlon Plan from union business.[9] As long as union officers are excluded from the cooperative aspects of the relationship, they will exploit the destructive.

Impact on Management. If anything, management's adjustment to the Plan is more difficult than the union's. Within the union important decisions are usually subject to extensive discussion; union officers are accustomed to rank-and-file objections. On the company side one-man decisions are typical. (Ironically, in many instances, the Plan is introduced without middle or lower management being consulted—which may result in feelings of antagonism towards it.) Yet, if the Plan is to be successful there must be far more acceptance by management of democratic and consultative procedures.

Supervisors are accustomed to criticism from above. Now, however, subordinates may question their decisions to their faces, and the adjustment is difficult.

While the typical grievance procedure limits itself to a relatively small range of management activity, with the Plan nearly the whole range of company decision making comes under union scrutiny. We find that the individual who relishes a union leader's job because it gives him an opportunity to use his powers of observation, reasoning, and argument takes a Screening Committee job with the same needs predominating. For him it is quite a thrill to catch a white-collared, suit-coated official in a bad blunder. While managers give efficiency an important place in their scale of values, we wonder how frequently they appreciate such an alert insider who provides a running critique of their activities.

Take the foreman as an example. His attitude is critical. An antagonistic foreman can do much to cut off the flow of suggestions (Dreyer, 1952, p. 243). Suggestions can in fact easily threaten his position (Shultz, 1951). Many call attention to his inefficiencies, or bring forth ideas which he should have thought of himself. By now he may well have become adjusted to union grievances against his personnel policies. However, it requires quite an additional adjustment to accept criticism as to how he handles the production end of his job.

Furthemore, the Plan makes it possible for the union to go over the foreman's head and expose his shortcomings to top management through bringing suggestions directly to the Screening Committee. Even if the suggestion implies no failure on the foreman's part, still by-passing takes

[9] Here we disagree with McGregor and Knickerbocker (1942, p. 5) who feel that since "it is not possible for management and the union to compete and cooperate at once on the same problem" it is better to separate the two functions. We feel that cooperation and competition are not black and white opposites and that it is possible to have competition within cooperation.

the decision-making power out of his hands. In a way the Plan provides an added technique for top management to control and check up on the foreman.

Of course, management has had other techniques for finding out what is happening at the worker-foreman level. Among these are staff activities such as accounting, quality control, safety inspections, and so forth. Yet over time, lower management has been able to develop informal techniques of preventing bad news from being communicated upwards. With the introduction of the Plan the foreman must make similar new arrangements to protect himself. As in the case of grievances, we would expect "deals" between the foreman and union production committeemen to prevent "trouble" from being exposed. (After all, those who criticize the foreman also receive their work assignments from him.)

Top managers too must adjust. They must consult with the union on a much broader range of subjects. Probably, however, a majority of suggestions include matters which would not normally be taken up at their level; [10] consequently, their own decisions are less often questioned. In fact, as suggested, they might find the Screening Committee useful precisely because it provides information which they might not otherwise obtain. And being *top* management they have little fear that the union will tattle on them in turn.

Probably staff (particularly production control) and middle management are most threatened by the Plan. They are subject to the same embarrassment as the foremen, but sit on neither Production nor Screening Committees. As the "little men who aren't there" they can easily become the scapegoats for everyone's troubles. [Of course, good relations can develop between staff and workers, as apparently they have at the La Pointe Machine Tool Company, the best publicized of the Scanlon Plan situations (Whyte, 1955, pp. 178–180).]

We feel that if union-management cooperation is to be successful, top management must be constantly alert to the danger that lower levels of supervision may feel left out (see Jacques, 1951, p. 189), that they will feel that top management listens more attentively to the union than it does to them. (In our researches with non-Scanlon Plan companies we have discovered many incidents where foremen have induced workers to file grievances or suggestions to gain improvements which they were unable to gain themselves through normal channels. Unless channels of communication in internal management are improved, these problems might be even more serious under the Plan.)

Unless management's morale is to decline disastrously, establishment of effective two-way communication between workers and management must be accompanied by equal improvements within management itself.

[10] Dreyer's thesis (1953) which includes a complete listing of the suggestions offered in the plant he studied confirms this.

Impact on Intergroup Relations. One of the disadvantages of traditional incentive plans is that they engender ill-feeling between groups. This is particularly true where the technology of work makes one group's earning possibilities depend on the production of another group, or, where, as is almost inevitable, groups suspect each other of having "loose" rates. (See Whyte, 1955, Chs. 8–9.) The Scanlon Plan presumably eliminates the problem of intergroup rivalry through establishing plant-wide incentives. But does it?

A plant-wide incentive means that each individual's earnings are dependent upon the efforts of the entire plant. Harder work by any one individual will bring him only negligibly higher monetary return. Hopefully, self-satisfaction, a desire for praise from fellow workers, and interest in the group as a whole will be sufficient to elicit high productivity. For this to happen requires a high degree of cohesion and identification with the plant as a whole as well as with the individual department.

How likely is this to occur? The answer depends on a number of factors, including the size, homogeneity, and history of the work force.[11] One thing is certain: There are bound to be some rivalries between groups and constant skill in human relations is required to prevent them from becoming more serious. All the evidence suggests that loyalty is greater to the face-to-face group than to the plant as a whole. We think it is too much to expect that traditional differences between the office and the shop and among various departments in the plant will disappear as soon as cooperation begins.

In fact, we would predict that union-management cooperation might bring greater inter-departmental antagonism.[12] No longer is it possible to unite all departments against the common enemy—management. It is too easy to pass the blame for poor production to another group, for Department X to say, "Why should we work hard when Department Y

[11] We would hypothesize, for instance, that the Plan would be more successful where workers are tied closely together by the flow of work. Where there are sharp technological boundaries between departments and the work of one is relatively independent of the work of others, we would expect less feeling of plant-wide unity. At the other extreme, where the plant is technologically a single unit (as in assembly-line production and certain chemical processes) the efficiency of a single department is hard to measure. As a consequence feedback is difficult and the Plan may suffer.

This suggests that the Plan will be most successful within a rather narrow range of technologies.

[12] Still to be investigated is the situation at La Pointe (the best known of the Plans) where some draftsmen and designers tried to break away from the Steelworkers Union to join the American Federation of Technical Engineers and remained with the Steelworkers only after considerable pressure was exerted by management. *La Pointe Machine Tool Company,* 109 NLRB 514 (1954); 113 NLRB 171 (1955).

has fallen so far behind?" In one situation we studied, considerable antagonism was expressed against the office group. Production men said, "Why should they get a bonus when we are doing all the extra work? They come late to work and no one cares."

Of course, the larger the plant, the greater are the possibilities of dissension, and the more difficult it becomes to maintain support for plant-wide production goals. Indeed it may be questioned whether in larger plants support for a plant-wide goal can be maintained.

Perhaps motivation for the overall goal would be greater were each department also given a goal of its own. Certainly union members with whom we talked were constantly checking on how their department was doing compared to the rest. Even though formal figures were not given, workers were able to develop their own informal indices of success.

Departmental goals might lead to still further problems. If Department A does better than Department B, Department A might ask, "Why should we work so hard if Department B goofs off and gets as much bonus as we?" Department B might well reply that their failure was due to lack of cooperation from other departments and to having an excessively high standard.

Furthermore, what happens when one department decides it is working hard enough and other departments put pressure on it to work harder? Will the union leadership seek to get them to agree "voluntarily" to raise their quota through group goal setting? Such "masterminding" seems to be the standard approach of the Soviet state. Although it may be the only way of effectively solving the problem, to us it seems ethically wrong.

Further research is needed to discover the skills used by union and management leaders, in plants where the Plan was successful, to smooth out the inevitable conflicts. However, we believe the success of the Plan will be limited in larger plants unless some method is devised of establishing departmental subgoals and thus harnessing loyalty to the face-to-face group.

Impact with the Department. It should be emphasized that increased production is possible without workers putting forth any greater physical effort, chiefly through 1) new ways of doing things suggested by workers, 2) less resistance to change, 3) pressure brought by the union against all levels of management for greater efficiency, and 4) greater cooperation among individuals.

In at least one well-known case of union-management cooperation, increases in productivity and bonus earnings have come as a result of *no* measurable increase in worker effort. Management is satisfied to maintain the original bonus formula intact while rapidly introducing labor-saving equipment. Naturally, productivity as measured by this ratio has soared. The rationale for not changing the formula to reflect real worker efforts

rather than capital investment has been: "We are satisfied that our plan serves to eliminate any real opposition to labor-saving equipment. We don't have to fight over how many men are going to man a new piece of equipment and the old employees readily accept transfers. In fact, we get demands for new equipment faster than we can afford to put it in."

However, if cooperation is to reach its fullest flower, there must be actual changes in workers' concepts of what they think is a normal day's work. As we know, practically every work group has informal group standards which determine the proper amount of work. The man who produces too much or (in some cases) too little becomes a deviant, if not an outcast. Therefore, we should expect greater individual effort to occur chiefly because of raised standards.

This means:

1) The upper limits to production may be raised and weakened. The worker's goal becomes to surpass, not stay within the quota. [Thus at La Pointe one worker, who had been one of the highest producers before the Plan started, tripled his output after it went into effect (Shultz and Crisara, 1952).]

2) The lower limit of permissible production may be strengthened and raised. This is another way of saying that pressure might be put on slackers.

3) Along with this, there may be some sort of *implicit* goal setting—that is a general feeling that "We ought to produce more" or even "We ought to produce 15% more." This goal normally provides individual motivation, but it is also a focus around which group pressures can operate. That is, if there is a goal, those who do not cooperate in attaining it may be subject to group displeasure.

Can changes in standards be induced merely through giving rewards for higher production? (See Whyte, 1955, Ch. 12.) We think that better results can be obtained through some sort of explicit decision-making process. We suspect, for instance, that insufficient attention has been given to the value of department meetings as a means of getting group acceptance of changed standards.[13] In particular, experiments might be tried in group goal setting.[14]

In any case, with or without goal setting, we believe that good relations within the department are crucial to the general success of the Plan. Only good relations between top union and top management can create

[13] In one situation the union president told us, "We try to avoid departmental meetings because the problems can be better handled in the general membership meeting with everyone there." Our own experience with non-Scanlon situations indicates that department meetings generally have higher attendance and more interest than plant-wide ones.

[14] Alex Bavelas has already experimented along these lines (Maier, 1946, p. 265; Whyte, 1955, ch. 9).

the conditions necessary for cooperation and high productivity. There also must be a change in interaction, sentiment, and behavior on the shop level. Key to this are the roles of the production committeeman of the union and the shop foreman.

First let us consider the production committeeman. If he is to make his job a success he must do more than merely sit in on periodic Production Committee meetings. He should make an active effort to involve others in the suggestion-making process, make regular rounds to collect them, and even encourage group discussions of production problems. If relations are good, the foremen may take part in these discussions. However, where the Plan is a failure, many workers pass the buck for making suggestions to their committeeman and gripes may arise such as "We certainly have a lousy committeeman—there are dozens of possible suggestions he never notices."

In our study of grievances we found that as relations became more friendly and more mature, a smaller and smaller proportion of grievances were put in writing. We might expect to find the same thing with suggestions. Where relations are good, suggestions will be discussed informally between foreman, production committeeman and worker. They will be put in writing only when the suggestion requires approval of higher management—and even here things can be handled informally.

The number of written suggestions handed in should not be considered as a measure of the Plan's success or of relative interest in various departments—any more than is the number of grievances an indication of poor union-management relations. In fact, since grievances and suggestions seem to converge, it is rather curious that a large number of suggestions are considered as evidence of *good* relations, but the reverse in the case of grievances.

The role of the foreman has been already discussed. If he is perceived as uncooperative, workers may feel that the Production Committee is entirely useless. Suggestions may take the form of group demands, with committeemen acting as "spokesmen" because individuals are afraid to stick their necks out. The purpose of suggestions under such circumstances is to bring out evidences of inefficiency which can then be brought to the attention of top-level union and management to the embarrassment of lower levels. In fact, we would expect that some workers would bypass production committeemen and their foremen altogether and give their suggestions (or more properly gripes) directly to the Screening Committee or to the membership meeting. (There was considerable evidence that this was happening in one of the plants we studied where the Production Committees hardly functioned at all.)

On the other hand, the foreman can take the initiative and present problems on which he needs help directly to the Production Committee and his men. Conceivably all decisions could be made on the basis of

group discussions with the foreman functioning primarily as a discussion leader. Workers would bring their problems directly to him (or to whoever else was in a position to implement a suggestion [15]). The foreman would ask the advice of the group whenever he ran into difficulties. Communication would be two-way as would originations of action. Obviously such a relationship requires foremen and union representatives to make considerable adjustments in their traditional behavior.

Further research is required to discover the skills used by leaders on both sides in the plants where the Plan has been most successful. However, we believe such success depends to a large degree on the establishment of democratic leadership throughout the management hierarchy and particularly on the department level.

Conclusion

From our analysis, we arrive at certain very tentative hypotheses as to the main areas of difficulty. These should be subject to further research. If they are correct, they explain in part why the Plan has been more successful in some situations than others—and why sometimes it has failed.

1. Interaction must be balanced and include all segments of the plant community. The Plan will fail if the union uses it exclusively to vent its gripes, or if management looks upon it as a means to make the workers docile enough to accept a speed-up. Similarly, cooperation will not work if important groups of workers do not participate.

2. Unless the union members are to think their officers have "sold out" there must be considerably more communication between the leadership and the rank-and-file. The local meeting is one form of communication, but informal contacts and departmental meetings may be more effective. Certainly, it may be better not to try to separate union collective bargaining functions completely from the Plan.

3. Within management also, more communication is required. Particular efforts are required to prevent middle management and staff from feeling completely left out. Management in general must become more tolerant of criticism and be willing to look to the union for advice. Certainly if the Plan is looked upon *just* as a means for reducing worker-management conflicts, it is bound to fail. Rather it is a method of bringing such differences out into the open and perhaps resolving them.

4. Particularly in larger plants there is a difficult problem in preventing buckpassing between rival interest groups and maintaining involvement in the overall goal. We fear that as the size of the unit concerned in the Plan increases, the difficulties in maintaining involvement and communi-

[15] Apparently it was quite common at La Pointe to bring problems directly to the staff department concerned (Shultz and Crisara, 1952, p. 57).

cation will increase even faster. This may explain why the Plan so far has been adopted chiefly in smaller companies.

5. Cooperation can be too easily confined to the top-union-management level. This means that there must be more cohesion and greater communication within the face-to-face work group and between it and the foreman.

The foreman's whole style of supervision must be changed. He must act far more as a group leader than as a traditional boss. He must ask the group for suggestions, coordinate their replies, and possibly even lead them into group decisions to raise production levels.

Departmental meetings should be used more frequently than in the situations we observed and attempts made to get group goal setting. (Although the authors are acutely aware of the possibility of "manipulation.")

The success of the Plan requires a substantial change in the social organization of the plant and the maintenance of a high level of interaction through all its parts. To do this, skill in human relations of an extremely high order is required.

In many areas our discussion has been almost entirely hypothetical since so little is really known. Further research with the problems of making the Plan work is desirable—not just because the Plan is a promising partial solution to some difficult industrial relations problem—but to increase our knowledge of human organization generally.

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4. The Organization and Its Communication Problems * [1]

Jay M. Jackson

Business executives, I am told, are very similar to other people: they have communication problems, too. They are concerned, of course, about better understanding among all persons. They are interested in overcoming barriers to communication between members of the public and their own particular industry. They are especially concerned, or should be, about problems of communication within an organization, since business administration by its very nature is a collective enterprise, and people in this profession must spend their days in organized groups, or organizations.

First, I want to discuss some characteristics of all organizations that create communication problems. Second, I shall present some conclusions based on recent research findings regarding the forces which determine the flow of communication in an organization. Next I shall consider the consequences of communication in a number of conditions that often exist within an organization. Finally, I shall attempt to indicate that what we call problems of communication are often merely symptomatic of other difficulties between people.

Characteristics of Organizations. What is it about organizations that seems to make communication especially difficult? An organization may be considered a system of overlapping and interdependent groups. These groups can be departments located on the same floor of a building, or

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[1] This article was originally presented as an address to the Society of Public Health Educators at their Seventh Annual Meeting, Atlantic City, N.J., in 1956. The original place of publication was the Society of Public Health Educators, Inc., Monograph No. 1, 1957. It is reprinted here with editorial changes from *Advanced Management,* February, 1959. We gratefully acknowledge permission.

they can be divisions scattered over the face of the earth. Other things being equal, people will communicate most frequently to those geographically closest to them, even within a relatively small organization. Spatial distance itself can thus be a barrier to communication.

Each one of the subgroups within an organization demands allegiance from its members. It has its own immediate goals and means for achieving them. It distributes tangible or intangible rewards to members of the group, based on their contribution to these objectives. When any particular communication is sent to a number of subgroups in an organization, each group may extract a different meaning from the message, depending upon its significance for the things the group values and is striving to accomplish.

The groups in an organization often represent different subcultures—as different, for example, as those inhabited by engineers, accountants, and salesmen. Each occupational or professional group has its own value system and idealized image, based on its traditions. These are guarded jealously, since to a considerable degree they give the members of that group their feelings of identity. Other groups in an organization, based on experience, age, sex, and marital status, have to varying degrees similar tendencies. Each develops along with its peculiar value system a somewhat specialized system of meanings. What is required to communicate effectively to members of different groups is a system of simultaneous translation like that employed by the United Nations. This simultaneous translation must be taking place both within the sender and the receivers of communication.

It is also characteristic of organizations that persons are structured into different systems of relationships. A work structure exists: certain persons are expected to perform certain tasks together with other persons. An authority structure exists: some people have responsibility for directing the activities of others. The status structure determines which persons have what rights and privileges. The prestige structure permits certain persons to expect deferential behavior from others. The friendship structure is based on feelings of interpersonal trust.

These systems of relationships overlap but are not identical. Each has an important effect upon communication in an organization, for each influences the expectations people have regarding who should communicate to whom about what in what manner. Now, how often do people openly and freely discuss these matters and come to agreement? Since these areas involve ranking of persons and invidious distinctions, they are commonly avoided. Yet disagreements and distorted perceptions about questions of relationship in an organization are the source of many communication difficulties.

What intensifies these communication problems is the fact that relationships among persons in an organization are in a continual state of

flux. Personnel losses, transfers, promotions, and replacements are occurring. Decisions about new policies and procedures are being made, and these often modify relationships. Some people are informed about changed relationships before others; some are not informed at all. Although it is common practice to communicate decisions to all the persons who are affected by them, the problem is often to determine who are the relevant persons. Unless we are extremely sensitive to the social structure of our organization, it is likely that we shall restrict communication too narrowly. The restrictive communication of decisions about change, however, can be extremely disruptive to any consensus people have about their relationships to one another, and thus can create for them problems of communication.

The Flow of Communication. Any solution of a communication problem must be based on an analysis of the particular situation in which the problem occurs and an application of general principles about communication. It is possible, on the basis of findings from research, to formulate a number of principles about the forces in an organization which direct the flow of communication.

You may have heard at one time or another that communication flows downward all right in an organization; the problem is to get communication from below. This is only partially true. In fact, any generalization that communication flows down, up, or across is equally false. Communication is like a piece of driftwood on a sea of conflicting currents. Sometimes the shore will be littered with debris; again it will be bare. The amount and direction of movement is not aimless or unidirectional, but is a response to all the forces—winds, tides, and currents—which come into play.

What forces direct communication in an organization? They are, on the whole, motivational forces. People communicate or fail to communicate in order to achieve some goal, to satisfy some personal need, or to improve their immediate situation. Let us examine briefly some of the evidence from research which supports this statement.

A study was made of the communication patterns among the personnel of a medium-sized government agency.[2] Everyone was included in the research, from the director to the janitor. It was found that people communicated far more to members of their own subgroups than to any other persons. They also preferred to be communicating to someone of higher status than themselves and tried to avoid having communication with with those lower in status than themselves. The only exception to this tendency was when a person had supervisory responsibilities, which removed his restraints against communicating with particular lower status persons. When people did communicate with others of the same status

[2] Jay M. Jackson, "Analysis of Interpersonal Relations in a Formal Organization," Ph.D. Thesis, University of Michigan, 1953.

level in the organization, there was a strong tendency for them to select highly valued persons and to avoid those they thought were making little contribution.

Let us see if we can find a principle which explains these results. The formal subgroupings in an organization are usually based upon joint work responsibilities. There are strong forces, therefore, to communicate with those whose work goals are the same as one's own. A supervisor can accomplish his work objectives only by having relatively frequent contact with his subordinates (and he probably would like to have more contact than he has). The people in an organization who are most valued for their ability to contribute are those who can give the best information and advice. Others seek them out. These findings all seem to point to the same conclusion:

1. In the pursuit of their work goals, people have forces acting upon them to communicate with those who will help them achieve their aims, and forces against communicating with those who will not assist, or may retard their accomplishment.

In the midst of one study of a housing settlement,[3] a rumor swept through the community and threatened to disrupt the research. Turning their attention to this rumor, the investigators were able to trace its path from person to person. They were trying to understand the forces which led people to communicate. Later on they tested their understanding by deliberately planting a rumor in an organization and again tracing its path by the use of informants.[4] They concluded that people will initiate and spread rumors in two types of situation: when they are confused and unclear about what is happening and when they feel powerless to affect their own destinies. Passing on a report is a means of expressing and alleviating anxiety about the subject of the rumor.[5]

Let us consider one more fact before we draw a general conclusion from these findings. Studies in industry, in a hospital, and in a government agency all yield the same result: people want to speak to higher status rather than lower status persons.[6] Why are there these strong forces acting on people to direct their communication upwards? Higher status persons have the power to create for subordinates either gratifying or depriving

[3] Leon Festinger, Dorwin Cartwright, *et al.*, "A Study of Rumor: Its Origin and Spread," *Human Relations,* **I** (1948), 464–486.

[4] Kurt Back, Leon Festinger, *et. al.*, "The Methodology of Studying Rumor Transmission," *Human Relations,* **III** (1950), 307–312.

[5] For an illustration of this in a hospital setting, see Jay Jackson, Gale Jensen, and Floyd Mann, "Building a Hospital Organization for Training Administrators," *Hospital Management,* September, 1956, p. 54.

[6] See Elliot Mishler and Asher Tropp, "Status and Interaction in a Psychiatric Hospital," *Human Relations,* **IX** (1956), 187–206; Jackson, "Analysis of Interpersonal Relations in a Formal Organization"; Tom Burns, "The Directions of Activity and Communication in a Departmental Executive Group," *Human Relations,* **VII** (1954), 73–79.

experiences. These may take the form of tangible decisions and rewards, or perhaps merely expressions of approval and confidence. Lower status persons need reassurance about their superiors' attitudes, evaluations, and intentions towards them. We can conclude that:

2. People have powerful forces acting upon them to direct their communication toward those who can make them feel more secure and gratify their needs and away from those who threaten them, make them feel anxious, and generally provide unrewarding experiences.

Personal needs largely determine the content of communication to others of different status. There is evidence that subordinates often are reluctant to ask supervisors for help when they need it, because this might be seen as a threatening admission of inadequacy.[7] And superiors tend to delete from their communications to subordinates any reference to their own mistakes or errors of judgment.[8] I am sure that these findings are in accord with the experiences that many of us have had in organizations.

A third principle which helps us understand the flow of communication is this:

3. Persons in an organization are always communicating as if they were trying to improve their position.

They may or may not be aware of their own behavior in this respect, but the evidence indicates that they want to increase their status, to belong to a more prestigeful group, to obtain more power to influence decisions, and to expand their authority. Talking upwards may be a gratifying substitute for moving upwards. Persons in an organization who are attracted to membership in a particular department or group will feel inclined to direct much more communication in that direction than will those who do not want to belong to it. If they are excluded or barred from membership and their desire to belong persists, they increase their communication even further, as if doing so represents a substitute for actually moving into the desirable group.[9]

A study of the role relationships of three types of professionals who work together in the mental health field [10]—psychiatrists, clinical psychologists, and psychiatric social workers—found that the direction, amount, and content of the communication to one another can be pre-

[7] Ian Ross, "Role Specialization in Supervision," Ph.D. Thesis; Columbia University, 1957.

[8] This finding is from an unpublished study of a public utility company by Alvin Zander.

[9] Experimental evidence exists for this statement in Jay Jackson and Herbert Saltzstein, *Group Membership and Conformity Processes* (Ann Arbor: Research Center for Group Dynamics, University of Michigan, 1956), p. 89; see also Harold Kelley, "Communication in Experimentally Created Hierarchies," *Human Relations,* **IV** (1950), 39–56.

[10] A. Zander, A. R. Cohen, and E. Stotland, *Role Relations in the Mental Health Professions* (Ann Arbor: Institute for Social Research, University of Michigan, 1957).

dicted largely from two factors. These are (1) their perception of the other professions' power relative to their own and (2) how satisfied they are with their own power position compared to that of the other groups. The general principle that forces act on persons to communicate so as to improve their relative position in the organization seems to be supported by all these findings.

The Consequences of Communication. Recent research also has something to tell us about the consequences of communication when various conditions exist within an organization. Again, it is not possible to state that a particular type of communication always has the same effect unless we specify the conditions in which the generalization holds true. At the present time, however, the evidence from research appears to warrant four general conclusions.

1. The effect of any particular communication depends largely upon the prior feelings and attitudes that the parties concerned have towards one another.

Findings from a number of different studies support this statement. During World War II, hostile attitudes and negative stereotypes existed between the inhabitants of a housing project for industrial workers and the members of the surrounding community. An action research project was undertaken [11] to increase contact between these two groups. It was found, however, that after increased contact the attitudes and feelings of these people became polarized: those that were initially positive became more positive, and those that began by being negative became even more negative. The effect of stimulating greater contact could have been predicted only from a knowledge of the pre-existing attitudes and feelings.

In another study of the communication patterns in a large organization, it was found that increased communication did make people more accurate about others' opinions, but only when they initially trusted one another and already were in considerable agreement.[12] When people are in disagreement or do not trust one another, an increase in communication does not necessarily lead to greater understanding.

Another study discovered that frequent communication among personnel made working for the organization either more or less attractive for them. The mediating factor was whether the persons who were in constant communication valued each other's contribution to the work of the organization.[13]

[11] Leon Festinger and Harold Kelley, *Changing Attitudes Through Social Contact* (Ann Arbor: Research Center for Group Dynamics, University of Michigan, 1951).

[12] Glen Mellinger, "Interpersonal Trust as a Factor in Communication," *Journal of Abnormal and Social Psychology,* **LII** (1956), 304–309.

[13] Jay M. Jackson, "Reference Group Processes in a Formal Organization," *Sociometry,* in press.

2. The effect of any particular communication depends upon the pre-existing expectations and motives of the communicating persons.

Executives of a large organization were asked to indicate on a check list how much time they spent with each other and what were the subjects of their interactions.[14] In one third of the answers the men disagreed about the topics of their communication. For example, one reported that he had been discussing personnel matters with another; the latter thought they had been discussing questions of production. When these executives differed, each assumed that the problem with which he was personally most concerned was what they had really been talking about.

The subjects of this study were men with an engineering background. They consistently overestimated the amount of time executives spent on production matters and underestimated the amount of time spent on personnel problems. The impressions their communication made upon themselves had been shaped by their own goals and motives.

From this and other studies it seems clear that the consequences of communication are limited by people's interest in achieving certain effects and their lack of concern about achieving others. They are inclined to remember and feel committed to those decisions which are consistent with their own expectations and motives.

3. The effect of a superior's communication with a subordinate depends upon the relationship between them and upon how adequately this relationship satisfies the subordinate's needs.

Communication between superior and subordinate often has consequences which neither of them anticipates or welcomes. It is especially difficult to avoid problems of misinterpretation or ineffectiveness in this area.

In one organization it was found that some employees who received frequent communication from their supervisor became more accurately informed about their supervisor's real attitudes; but this was not true for other employees who also had constant contact with their supervisor.[15] The difference was traced to whether a supervisor said he trusted his subordinates. When he did not trust them, he was more guarded in what he said to them and revealed less of his true feelings. A lack of trust between superior and subordinate thus can act as a barrier to the creation of mutual understanding.

We have discussed how people's need for security directs their communication toward higher status persons in an organization. A study in a public utility company [16] varied experimentally the kind of communication supervisors gave their subordinates. Employees became anxious and

[14] Burns, *op. cit.*

[15] Mellinger, *op. cit.*

[16] Arthur Cohen, "Situational Structure, Self-Esteem, and Threat-Oriented Reactions to Power," a chapter in Dorwin Cartwright, ed., *Studies in Social*

threatened in response to two different conditions: when communication from their supervisor was unclear and when the supervisor was inconsistent in what he said from one time to another.

We have also pointed out that the persons in an organization tend to communicate as if they were constantly attempting to improve their positions. This result is consistent with the finding that the experienced employees in an organization resent close supervision,[17] since closeness implies that their power and prestige are less than they want them to be.

The study of the senior staff members in a British engineering plant, referred to earlier, led to the discovery of a process of "status protection." When these men received instructions from their superiors, they often treated the items as merely information or advice. In this manner they in effect achieved a relative improvement in their own position in the authority structure, by acting as if no one had the right to direct their activity.

Thus the findings from laboratory and field research point unequivocally to the supervisor-subordinate relationship as one of the crucial factors determining the effect of a supervisor's communication to subordinates. Another major consideration is whether the subordinate stands alone in his relationship to the supervisor or belongs to a group of peers in the organization.

4. The effect of a superior's communication with a subordinate depends upon the amount of support the subordinate receives from membership in a group of peers.

An experimental study has demonstrated the remarkable effect that belonging to a group of equals has on a subordinate confronted by a powerful and directive superior.[18] Being a member of a group decreased a person's feelings of threat and freed him to disagree with his supervisor and make counter-proposals. The person who had the moral support of membership in a group reacted to his supervisor's communication with less defensive and more problem-oriented behavior.

A considerable body of evidence also indicates that a group acts as a source of "social reality" for its members and thus provides them an opportunity to validate their ideas and opinions.[19] When communication

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Power (Ann Arbor: Research Center for Group Dynamics, University of Michigan, 1959).

[17] This finding is from an unpublished study by Jay Jackson, Jean Butman, and Philip Runkel of the communication patterns and attitudes of employees in two business offices.

[18] Ezra Stotland, "Peer Groups and Reactions to Power Figures," a chapter in Dorwin Cartwright, *op. cit.*

[19] See, for example, Jay M. Jackson and Herbert D. Saltzstein, "The Effect of Person-Group Relationships on Conformity Processes," *Journal of Abnormal and Social Psychology,* **LVII** (1958), 17–24.

from a superior is directed to a group as a whole rather than to isolated individuals, it is likely that more accurate transmission of information is achieved.

Problems of Communication Are Often Symptomatic. From our discussion thus far, I think it should be clear that what we call communication problems are often only symptoms of other difficulties which exist among persons and groups in an organization. To summarize what has been said or implied, I should like to point to four problems which people in organizations must solve in order to overcome barriers to communication:

1. *The problem of trust or lack of trust.* Communication flows along friendship channels. When trust exists, content is more freely communicated, and the recipient is more accurate in perceiving the sender's opinion.

2. *The problem of creating interdependence among persons: common goals and agreement about means for achieving them.* When persons have different goals and value systems, then it is especially important to create mutual understanding about needs and motives.

3. *The problem of distributing rewards fairly,* so that people's needs are being met and so that they are motivated to contribute to the overall objectives of the organization. Nothing can be so restrictive of the free flow of ideas and information, for example, as the feeling that you may not obtain credit for your contribution.

4. *The exceedingly important problem of understanding and coming to common agreement about the social structure of the organization.* I can think of nothing which would facilitate more the free and accurate flow of communication in an organization than consensus about questions of work, authority, prestige, and status relationships.

5. How Aspiring Managers Promote Their Own Careers *

William R. Dill
Thomas L. Hilton
Walter R. Reitman

Few studies that deal with executive development focus on the early progress of those who aspire to managerial jobs in industry. Fewer still have focused on the process by which young men move ahead. Studies of the social origins of business leaders, for example, describe the importance of social and educational advantages; but they have little to say about the ways in which men with social and educational advantages move from their initial assignments in industry to top managerial posts.[1] Retrospective studies of how mature executives have achieved success are only as good as the executives' memories and understanding of events that took place fifteen to forty years earlier; and because these studies deal with the past, they have limited pertinence in trying to anticipate the careers of young men who are now entering management.[2] Psychometric studies of the personal characteristics of successful executives too

* Reprinted from the *California Management Review,* 1960, **11,** #4, 9–15, by permission of the authors and of The Regents of the University of California. This paper resulted from a longitudinal study which culminated in a book, *The New Managers,* Prentice Hall, Englewood Cliffs, N.J., 1962, by the same authors.

[1] See, for example, such diverse sources as W. Warner and J. Abbegglen, *Occupational Mobility in American Business and Industry* (Minneapolis, 1955); R. Bendix and F. Howton, "Social Mobility and the American Business Elite," in S. M. Lipset and R. Bendix, *Social Mobility in Industrial Society* (Berkeley, 1959), pp. 114–143; and S. J. Kaplan, "Up from the Ranks on a Fast Escalator," *American Sociological Review,* **24** (1959), pp. 79–81.

[2] The rapidity with which changes in the job of management are occurring is reflected in two recent books, R. A. Gordon and J. E. Howell, *Higher Education for Business* (New York, 1959) and R. C. Pierson, *The Education of American Businessmen* (New York, 1959). See also, G. L. Bach, "Some Observations on the Business School of Tomorrow," *Management Science,* 4 (1958), pp. 351–364; and H. J. Leavitt and T. L. Whisler, "Information Technology and Management in the 1980's," *Harvard Business Review,* **36** (Nov.–Dec. 1958) pp. 41–48.

often are content with correlations and are cautious in raising questions about process.[3]

Efforts to analyze early career progress are still in the speculative, exploratory stage. Martin and Strauss report on the importance of the "sponsorship" process.[4] The young man who wants to get ahead should make himself indispensable to someone higher in management who is already on the way to the top. Dalton and Coates and Pellegrin present data that serve as persuasive testimony of the role of informal, unpublicized variables (such as religion, nationality, and fraternal organization memberships) in promotion decisions.[5] Riesman, Whyte, and Argyris have argued that too often the road to success in American industry is through conformity and subservience to the organization rather than through creative, autonomous thought and action.[6]

More than we, as authors, would like, this article is in the speculative, exploratory tradition of the other articles and books cited; but in addition to presenting some findings about career progress among a sample of men that we have interviewed, we have made a modest effort to suggest ways of focusing future research efforts.

We began with two questions. Why do some men move ahead more rapidly in management during their first five or ten years in industry than others with essentially the same education and experience? To what extent do the men who move ahead rapidly act as agents of their own progress?

To answer these questions, we have drawn on interviews with 30 graduates of a two-year M.S. program in industrial administration that was established "to train men for ultimate advancement to general management positions." Almost all of the men did their undergraduate work in engineering or science. The men are distinguished as a group by a high level of intellectual ability—significantly higher than the average

[3] A current example is C. W. Ramfalk, *Top Management Selection* (Stockholm, 1957). This is a careful and an interesting study of executive progress in Swedish industry. We feel, however, that Ramfalk focuses on statistical tests to an extreme degree. Through this focus, he does not communicate much of the information that one needs to build from his experience to plan better programs of research on the questions that he attempted to study.

[4] N. Martin and A. Strauss, "Patterns of Mobility Within Industrial Organizations," *Journal of Business*, **29** (1956), pp. 101–110.

[5] M. Dalton, *Men Who Manage* (New York, 1959), Ch. 6; C. H. Coates and R. J. Pellegrin, "Executives and Supervisors: Informal Factors in Differential Bureaucratic Promotion," *Administrative Science Quarterly*, **2** (1957), pp. 201–215.

[6] D. Riesman, *et al.*, *The Lonely Crowd* (New Haven, 1950); W. H. Whyte, Jr., *The Organization Man* (New York, 1956); C. Argyris, *Personality and Organization* (New York, 1957); C. Argyris, "The Individual and Organization: An Empirical Test," *Administrative Science Quarterly*, **4** (1959), pp. 145–167.

for senior executives in an advanced management program at the same graduate school and higher than the average for most other graduate business schools. Most have middle-class family backgrounds. None of the men interviewed had been in industry more than eight years since graduate school.

The men are not a representative sample of college graduates in industry; but because of their ability and their combined training in engineering and management, they have been eagerly recruited by industry for a variety of jobs. Unusually high median starting salaries for the classes from which our sample was drawn reflect personal qualities of the men, the reputation of the school, and a growing interest of companies in hiring men with training in management.[7]

Our interviews ranged in length from two to seven hours and were recorded. Most were divided into segments, each one conducted by a different interviewer. The general pattern of interview questions was planned in advance, but the specific questions put to each individual varied. Usually about half the interview was devoted to finding out what a man was doing on his job, how his work had changed since starting in industry, and in great detail, how he had handled specific, major tasks. The remainder of the interview was used for questions about his career objectives, about the environment in which he worked, about his major sources of satisfaction and dissatisfaction, about his assessment of his own performance and potential, and about his outside activities and family life.

For a third of the men, we were able to get supplementary information in conversations with their superiors. These interviews were generally much briefer. In addition to evaluations of the men's performance and potential, interviews yielded valuable secondary perspective on the opportunities and constraints which the men faced.[8]

A study of the experiences of the thirty men whom we interviewed does not enable us to test, with precision, hypotheses about factors in career progress. It yields some interesting preliminary findings, however;

[7] *Business Week* (October 3, 1959), p. 63, noted that in medium-sized firms there had been an increase of 64 percent over recent years in the number of men in management, but an increase of 118 percent during the same period in the number of men in management who held business school degrees.

[8] Our efforts represent a continuation of a program of testing, in-school evaluation, and post-graduate follow-up that H. G. Miller and H. Guetzkow initiated in 1952. Other elements of the research have included (1) an annual administration of test and questionnaire batteries to incoming students, (2) the collection of grades and faculty and peer ratings on men while they are in school, (3) a limited program of interviews with graduates in 1954 and 1957, and (4) a questionnaire survey in 1958 of graduates of the school, of men who were admitted but who did not enroll, and of a sample of men who could have qualified for admission but who elected not to do graduate work.

and it suggests what we feel to be important strategies for further research.

Career progress, as our interviewees described it to us, depends greatly on the strategies or heuristics that an individual employs in "his game" with the organizational environment that he encounters at work. Understanding how a man "gets ahead," in this view, depends only indirectly on knowledge of his family background or of his personal traits. Primarily, it requires knowledge of the specific environment in which he works and of the heuristics he brings to bear in dealing with the constraints and opportunities that it provides. We hypothesized that relatively successful and unsuccessful interviewees would differ in their rules of thumb for diagnosing, evaluating, and responding to the environment.

This way of approaching career progress seems promising to us for several reasons. First, because the individual's interaction with his environment is stressed, we are forced to examine the process of advancement in industry—not just its correlates. Second, although there are problems in inferring a man's heuristics for operating in an organizational environment, it is reasonable to expect these heuristics to be more directly related to his performance than the biographical and personality variables that influenced the development of the heuristics. Third, the focus on heuristics which men use in problem solving and decision making has been shown in other studies to be an extremely fruitful one, leading both to different kinds of theories of problem solving and to new methods for being more precise and rigorous in the analysis and prediction of individual behavior. The work of Bruner and the work of Newell, Shaw, and Simon, in particular, show what can be done with relatively simple inferences about problem-solving strategies and their effects on outcomes.[9]

A first characteristic of the environment in large organizations is its indifference to the advancement of most individuals. Large companies today may offer assurance of tenure to young men, as Whyte and others have argued,[10] but they give no guarantee of promotion to top management positions. Relatively few of the men who enter from colleges and universities can become candidates for top jobs. Hence it is not surprising that among our interviewees, the men who have moved ahead rapidly are men whose goals are to advance. Their behavior is governed by the

[9] J. S. Brunner *et al., A Study of Thinking* (New York, 1956); A. Newell and H. A. Simon, "The Simulation of Human Thought" (RAND Corporation paper P-1734, 1959); See also W. R. Reitman, "Heuristic Programs, Computer Simulation, and Higher Mental Processes," *Behavioral Science,* 3 (1959). A pioneering effort at comparing a simulation model with other kinds of formal models is a doctoral thesis by J. Feldman, "An Analysis of Predictive Behavior in a Two-Choice Situation" (Carnegie Institute of Technology, 1959).

[10] Whyte, Jr. (See note 6); A. Harrington, *Life in the Crystal Palace* (New York, 1959).

desire to do managerial work or to achieve managerial income and status. They want to attain positions where they can act independently and be judged by results. As one said:

"I want to be in a position where if I get fired, I get fired for something *I do*—not something that somebody else does."

They are eager to try new jobs. They indicate that no job which they find themselves able to handle will satisfy them for more than a few years; and although they change organizations less frequently on the average than their less successful classmates, they actively scan the environment for alternative opportunities.

Among the men who progressed slowly, there was evidence of more limited aspirations. In contrast to their more successful counterparts, they professed:

1. Less desire for the specific benefits (such as power, autonomy, income, status) that a managerial position is perceived to confer.
2. Less tolerance toward the perceived costs of being a manager (such as personal isolation from subordinates, demands on time and health, insecurity of job tenure).
3. More commitment to and identification with their present jobs and present working conditions, a factor which Coates and Pellegrin have stressed in their studies of executives and supervisors.[11]

Questions of causal inference can be raised appropriately here. We cannot rule out the possibility that even after a few years in industry, the observed differences in men's goals were the result of their differential experiences of success and failure. The feedback of performance on levels of aspiration has been documented in other studies.[12]

To a large extent, though, the same differences in levels of aspiration that men reported after several years' experience could be seen when the men were still in graduate school. Thus, they can legitimately be considered as determinants as well as outcomes of progress in management.

In what ways might the display of active interest in advancement influence a man's progress? First, it may affect the jobs that he tackles, the standards that he sets for his performance, and the contacts that he tries to make. Second, in some situations it may actively help him bargain for a promotion. Third, we find evidence that a man's interest in advancement and his estimate of his own potentialities often affect the

[11] C. Coates and R. Pellegrin, "Executives and Supervisors: A Situational Theory of Differential Occupational Mobility," *Social Forces,* **35** (1956), pp. 121–126.

[12] R. Pellegrin and C. Coates, "Executives and Supervisors: Contrasting Definitions of Career Success," *Administrative Science Quarterly,* **1** (1957), pp. 506–517; E. Chinoy, *Automobile Workers and the American Dream* (New York, 1955).

judgments of superiors who lack other data on which to make independent assessments. This is particularly true where a manager must assess the potentiality of a subordinate whose work involves such "esoteric" techniques as computer simulation or linear programming. Under these conditions, as Festinger's theory of social comparison processes [13] might suggest, the man himself sometimes becomes the most trusted source of information about his own abilities and work.[14]

Interest in becoming a manager, though, is rarely a sufficient basis for "getting ahead." In working through the maze of constraints and opportunities that surround them, the men who want to advance rapidly must pay particular attention to the expectations and standards of the men who govern their chances for promotion.

This is not a simple matter of willingness to conform, as some recent popular writings have suggested. Even a man who wants to conform must first decide what to conform to. First of all, his environment changes continuously. Large organizations are not monolithic. Sub-units within them pursue different goals and impose different standards on employees. Each time a man takes on a new assignment or begins to work with new people, he becomes subject to different kinds of constraints. The instability and ambiguity of the environment is accentuated especially for the younger men who are moved around frequently for purposes of "orientation and training."

Second, the young men we interviewed got relatively little feedback from superiors about their performance and their chances for advancement. The flow of this kind of information is impeded by the demands of other tasks, by the reluctance of some supervisors to criticize or praise, and by the overly formalized, almost ritualistic evaluation schemes to which some organizations hold.

Third, the feedback is often deceptive. Our findings agree with Dalton [15] and others who have shown that there are sizable discrepancies between "public" standards for evaluating performance and the standards actually used. A man's search for information may also be hindered by wishful thinking, by conspicuous but irrelevant events in the organiza-

[13] "A Theory of Social Comparison Processes," in P. Hare *et al.*, *Small Groups* (New York, 1955), pp. 163–187.

[14] One graduate who was seeking an advanced position in electronic data processing and who had considerable time in which to carry out his search tried an experiment. Without advanced knowledge of what prospective employers might offer, he varied the "acceptable salary range" that he quoted to different employers. He received several offers; and on an annual basis, the amount of the offer in each case was about $500 below the minimum salary figure he had quoted to the company even though the highest and the lowest minima quoted to different companies were nearly $2,000 apart.

[15] Dalton (See note 5).

tion, or simply by the loss of information in transmission from one man to another. In some cases, the individual even may have to deal with deliberately misleading "suggestions" offered by his rivals for promotion.

Finally, conformity is not a simple matter. Because the environment is largely beyond a man's control, he cannot hope to choose a course of action which is sure to improve his chances for advancement. We find instead, as Simon and his colleagues have found in a number of other problem-solving contexts,[16] that individuals search for heuristics—rules of thumb which are likely to promote but which in no sense guarantee their success. A man's aspirations tend to be local, directed toward finding a satisfactory resolution of problems faced in his immediate job situation. The long-run implications of action often cannot be known in advance.

Even for men who have had relatively successful careers, a combination of inconsistencies and ambiguities in the environment will occasionally provoke a crisis. Consider an interviewee who had recently moved from a job in a market analysis group to the position of assistant to a factory manager. In his first few months of work, he greatly impressed the manager by his ability and ambition. The manager took a personal interest in his development, for the manager himself had advanced very rapidly as a young man. The manager soon assigned his assistant to work for the factory scheduling chief and gave the assistant the distinct impression that he would soon be put in charge of all production scheduling. The manager expressed considerable dissatisfaction with the way in which scheduling was being handled by the current chief, an older man who had fought his way up through night school and a long line of manual and clerical jobs to win a post in management.

The young assistant met a cold reception in the scheduling department. The scheduling chief had wanted an assistant with experience who could lighten his work load, not a new man to train. He resented the speed with which "youngsters with a college diploma" were moving into positions that were equal to his own.

The assistant had no clear evidence that his new boss felt this way, and he wanted to continue his upward progress. On the basis of the information that he had, he adopted as his operating heuristic strategies of behavior that presumed the continuing confidence and support of the factory manager and that rested heavily on the manager's expressions of disapproval with the scheduling chief's work. One night, after a week of particularly trying relations with his new boss, the assistant complained to the factory manager about the scheduling chief's refusal to delegate tasks or to consider new methods.

The factory manager listened and said very little; but within a short

[16] A. Newell, J. C. Shaw, H. A. Simon, "The Elements of a Theory of Human Problem Solving," *Psychological Review*, **65** (1958, pp. 151–166); H. A. Simon, "Theories of Decision-Making in Economics and Behavioral Science," *American Economic Review*, **49** (1959), pp. 253–283.

time, the assistant was transferred to a less important job under a very demanding supervisor and he was cut off from all but a few formal contacts with the factory manager. The assistant recognized that he had been demoted, and through a staff man in the plant, he gained a distinct impression that he stood in a much poorer relation with the factory manager. The manager never told his former assistant directly why he had been demoted; neither did the factory personnel man. Only after a period of several months did the manager tell his views to a man from outside the plant and give permission for the outsider to relay what he said to the ex-assistant. The young man's "mistake" while working under the scheduling chief had been to overlook the central proposition around which *The Caine Mutiny* was written: a man's first job is to satisfy his immediate superior. In this situation, it was more important to the factory manager that his assistant please the scheduling chief than that he initiate needed reforms in scheduling procedures.

This was a straightforward preference that the assistant might have recognized and could have followed if he had not come from another setting in which young men were encouraged to present new ideas and new methods, if he had been told that this was local policy, and if he had not been misled by his initial support from the factory manager.

The assistant we have described was not very sensitive to many of the facets of his new environmental situation.

The men who have made rapid progress seem, in their strategies, to be especially sensitive to specific features of the environment in which they are currently working. One man declares:

"I try never to ask my boss for anything that I think he will . . . feel that he has to say 'no' for. This is very hard for him to do."

Another comments with specific reference to his own recent experiences:

"If it gets to be known that you complete the job, it is worth a lot. . . . I think most of the failures in business are of incomplete jobs rather than incompetent jobs."

Such statements suggest that in analyzing the environment, a critical aspect of sensitivity is a man's ability to see himself, his surroundings, and his job the way that his superiors do—even though he need not always act as they would.

In their descriptions of how they have handled tasks, the more successful men tend to be more explicit in stating the goals they were working toward and in explaining the relation of these goals to the immediate environment. They emphasize in their descriptions of action and strategy not only what they do, but how their actions mesh with and depend on the actions of others around them. Describing attacks on problems, they are more explicit about the specific alternatives that were open and about the concrete conditions which affected their choices among them.

The less successful men, on the other hand, seem not to order their

heuristics for action so directly in terms of the immediate problem situation. In some cases, they seem less aware of what is expected of them; in other cases, they prefer to follow strategies which are familiar or which they personally prefer in place of the strategies which the situation might seem to call for.

As an example, two of our interviewees held short-term jobs as trouble shooters in small plants in poor financial condition. Their roles in the plants were ambiguous. Each was responsible to over-all company management for improving conditions, but each had to work through managers and supervisors who had been in the plant for a long time.

The first made a detailed analysis of the conditions necessary for organizational survival and kept this goal ahead of all others. He was sensitive to his personal relations with men in the plant and wanted them to be good, but he was willing to be known as "the man from the skunk works" in order to satisfy the situationally defined goal—keeping the plant going. The second man met similar problems and opposition; but defining his role chiefly on personal grounds, he directed his efforts mostly toward eliminating points of friction between himself and other employees. He does not claim to have accomplished much for the firm, but he refers with satisfaction to his success at making friends with plant personnel and customers. The role that the first man established for himself was essentially managerial, in keeping with the requirements of the higher management upon whom his career prospects then depended. The role that the second man adopted was not suited to accomplishing the job his superiors set him; it was conciliatory at the expense of being constructive. The first man made his plant profitable; the other did not.

A related difference between these two men which seems also to apply more generally in our sample is the attitude they showed toward the organizations they worked in. The first man, in reflecting on his experiences, reveals in his operating heuristics a high degree of detachment from the organization. The independence that he and some of the others who have moved ahead rapidly show seems based on confidence that they can handle their jobs, in belief that they can bounce back from unsuccessful performances, and in a firm distrust of the organization as a protector of their own long-run interests. Some of these men describe their relations with the organization as a game, with the organization characterized as not much more favorable an opponent than "nature." They believe that some of the short-run, local "opportunities" which turn up may harm their long-range career prospects. They maintain a wide range of independent contacts to evaluate their present position and to develop alternative opportunities. They are not likely, as are some of the less successful men, to rely solely on their immediate superiors to define tasks, to map their courses of action, or to find and screen alternative jobs.

We find that men also tend to profit by being aggressive and by taking the initiative in defining and elaborating their roles in the organization, provided they are careful to observe local norms about what young college graduates may and may not do. Seizing the initiative identifies a man as willing to accept responsibility, take risks, and as someone who will work without time-consuming supervision. Furthermore, it lets him emphasize in his performance the things he is most able to do or the things that have good chances of outcomes favorable to the organizational unit which he finds that have not been recognized or worked through by others in the organization.

In summary, we have argued that the men who do well at the start of their careers in large organizations *want* to do well in the jobs that such organizations provide. Their interests and the goals that they set themselves are consistent with the problems they must solve to get ahead. They have better developed analytic heuristics and thus are more sensitive to salient features of their immediate job environments. They are quick to adapt their strategy to the immediate local conditions they perceive. At the same time, their over-all problem orientation shows an attitude of detachment toward and independence from the organizations in which they work. They do not passively leave the definition of their job and the determination of their future to the discretion of their superiors. They regard themselves as active agents of their own progress. They are resilient to setbacks. They are more willing to take reasonable risks, and they meet reprimands or rejections with relative equanimity.

The goals and strategies of young men have not received the attention they deserve as factors in obtaining advancement into management. Our effort has been to discern the kinds of heuristics that different men have developed and used and to relate these to the environments in which they work. By still more intensive interviews and observation, both with the men and with their superiors, we hope to move beyond exploratory analysis of the kind reported here to more formal predictions about how men with different sorts of heuristics will fare in varying environments.

Part Eleven: LABOR-MANAGEMENT RELATIONS

1. Group Psychotherapy in Labor Relations: A Case Study *

B. J. Speroff

Generated by a kind of "social conscience," industrial management has accorded increasing attention to that area euphemistically referred to as Human Relations; and it has even seen fit to venture into fields of endeavor which it formerly considered to be foreign to its interests and needs. From its technological and mechanical orientation industrial management's emphasis has been slowly channeled into a biosocial awareness of the importance of the personal equation; that the individual and his work group are permanent and inexorable sources of both pain and pleasure in industrial life. A most interesting aspect, incidentally, about this awakening of management to the need for "humanizing" its organization along predetermined lines (paralleling technologic improvements of its operations), which can be classified as psychengineering, is the abject failure of the social organization to comprehend the nature and complexity of the problems of management.

As a consequence neither management nor employees have found a way to successfully bridge their misunderstandings and develop an empathic response aimed at reducing conflicts and tensions. With the advent of unionism the effort to understand one another and work in harmony has not been noticeably narrowed; and with each passing year more ways and means for formalizing the avenues of understanding and communication have arisen. And, with each new need or demand a new method, technique or procedure had to be evolved to assist both management and the union in the pursuance of their efforts to more effectively deal with one another; the individual demand has given way to collective bargaining; the informal understanding is now a written contract; the personal gripe becomes a formal grievance, *ad infinitum.*

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As a direct result of union-management relations the grievance has assumed overriding importance as a powerful instrument in labor relations. Unfortunately, it has also become a means whereby it has been used both injudiciously and with malice as often as not. With an increase in the volume of grievances, concomitantly management has had to increase its labor relations staff as well as continually train them in the fine art of effectively disposing of grievances.

There are an estimated 100,000 collective bargaining agreements in force today. These agreements, with their built-in due process machinery —the grievance procedure and arbitration—protect the personal rights of each worker just as the due process clause and the other articles of the Constitution of the United States protect the personal rights of every citizen. Since a grievance can generally be defined in terms of anything related to the job situation which an employee thinks or feels is wrong—be it either real or imaginary—the grievance machinery is essentially designed to answer problems once they have occurred.

Grievances Accumulated. A large steel company with a long history of labor unrest—work stoppages, work slow-downs, and strikes—found itself facing an increasing number of grievances with each passing year since the war. The past year was an especially turbulent one which eventually culminated in a two week strike because the union claimed over 1000 of their grievances were not satisfactorily disposed of. (Actually, some 600 grievances had been resolved, albeit not to the complete satisfaction of all union officers, with another 400 grievances being in the various steps of the grievance machinery. Nevertheless, 400 grievances is a sizable number to cope with particularly in view of the fact that a sister company with the same labor force had less than one-tenth of that number over the same time span.)

Over the previous four years top management had been changed three times in an effort to find an effective team which could make the plant operations profitable and straighten out its labor problems simultaneously. Also, during this period the Labor Relations Director and his staff of ten supervisors conscientiously sought to improve their skills by undertaking both formal and informal means of self and group improvement. Apparently, in spite of all efforts, labor-management relations deteriorated steadily and the labor relations supervisors were being "swamped" with grievances. Each labor relations supervisor was assigned to a given mill and he was fully responsible for handling all the grievances which arose in his bailiwick. The work load became unbearable; it stretched from a 5-day work week into six, and from 40 hours to 60 hours per work week.

A meeting with the industrial relations executives led to a decision that a new, radically different method was needed to assist the labor relations staff out of their dilemma. It was determined we had to deal with the attitudes and psychodynamics of each supervisor's way of working rather

than concentrating on the mechanical aspects. Such a course of action necessitated two procedures being applied: (1) initially setting up a non-directive, permissive climate of self-evaluation and self-examination, and (2) moving into a more directed, critique-centered direction geared toward re-orienting each supervisor's skills and capabilities. Inherent in these procedures is an application which pertains to education as well as other fields of endeavor; where there is a need to build it should be a solid foundation. If the foundation is solid the superstructure will be secure; if it is weak it cannot adequately support the structure built onto it.

Supervisors Needed New Orientation. One of the essential tasks therefore is to acquaint the supervisors with the manner in which they think, feel and behave; then by means of group discussion and evaluation, to develop insights and awareness into what they do and how they do it so they can take corrective or remedial steps to alter (and improve) their own methods in handling grievances. Once this foundation of how they feel, perceive and react to persons, places, and situations is examined and evaluated, the next step is to move in the direction of strengthening the mechanics of how to both effectively and efficiently operate in handling grievances.

The central problem to be faced here is one of having a person learn about himself not as he sees his action but as others do. We do not see things as they are but as we are! This usually involves having the person unlearn something and training or retraining him before a difference in behavior comes about. Furthermore, it is felt a more expeditious and beneficial therapeutic effect would be evidenced if one's peers rather than an outsider acted as the primary agents in propagating change.

Two weeks prior to the first meeting, the Labor Relations Director informed the ten Labor Relations supervisors that a new series of special meetings was to begin and that each man was to come prepared to fully represent and discuss a current grievance or one which he had recently handled and was still in the process of being adjudicated. These meetings were to be of two hours duration, after regular working hours, and to be preceded by dinner in the company dining room.

At the initial meeting the author explained the aims and purposes of the forthcoming series of meetings, together with outlining a general description of some of the techniques and procedures to be utilized during the course of the meetings. The group was asked for permission to tape record each meeting so each could be used to review and to evaluate the entire meeting after which the tape would be erased. The training group normally consisted of the Labor Relations Director, the ten supervisors, and the two heads of the Industrial Relations Department.

Basically, a less intensive form of group therapy than is conducted in a normal clinical session was called for inasmuch as these supervisors were

not disturbed or neurotic. The primary aim of these meetings was to critically examine the skills and capacities these supervisors used in the normal conduct of their affairs, and to suggest remedial and corrective measures which would make the supervisors personally more effective in the future.

After the initial briefing, the author arbitrarily called upon one of the Labor Relations supervisors to stand before the group near a chartpad (which could be used to provide visual assistance in whatever manner the supervisor saw fit), and make his presentation. The room arrangement was such that all participants were seated in a semi-circle with the person making the presentation at the open end of the semi-circle. The time it took to make a complete presentation of the facts behind a grievance together with the supportive evidence, which included records, statements from the principals, work samples, etc., varied with the nature of the grievance, but the mean time was 45 minutes.

Questions Welcomed. After the presentation was concluded each participant was allowed, in turn, to first ask questions and second suggest alternative courses of action and procedures or methods to be employed. (It was agreed by all participants that no interruptions would be permitted during a presentation, but a question could be asked which served to clarify or explain an obscure, unusual or involved point.) Questions were asked of the supervisor making the presentation in order to obtain information or raise questions pertaining to: (1) unanswered or unclear problems or statements germane to the handling of the grievance; (2) new interpretations or ways of looking at the grievance and what was involved in it; and (3) tieing up loose ends or flaws which required additional attention and/or consideration.

After each participant had asked his questions the next step centered about suggesting different methods or means for handling this particular grievance. If any differences occurred in this step, role-playing was utilized in an effort to secure a more realistic understanding rather than a mere recital of one's convictions or hunches.

The following phase in the procedure was one of extreme importance because it aimed at crystallizing the entire presentation and discussion into three problem areas which were to be answered on the basis of the accumulated fund of information: (1) what are the key issues involved in this grievance and why? (2) what is or should be management's position with respect to these issues and why? (3) what does the union expect to gain by this grievance, and what implications does it hold for management? In most instances little disagreement was evidenced in conjunction with the first two problem areas, but the third one oftentimes proved difficult to answer. It was at this juncture that one's empathic ability was truly tested by a series of role-playing scenes. Those role-playing experiences proved most enlightening and valuable from two standpoints:

(1) it revealed the inflexible, obdurate orientation of some of the supervisors, and (2) it opened up some supervisors' eyes to the hidden purposes which often underlie the filing of grievances under various sections of the labor contract. (Another interesting finding which was uncovered and which paralleled what actually occurred in grievance hearings was the withholding of facts as the first step by the union.)

Up to this point the entire proceeding had been problem-centered with little attention paid to the personality dynamics of the supervisor making the presentation. Therefore, the next order of business was to view the presentation in terms of the personal make-up of the supervisor, and to relate his actions or inactions against a background of his intellectual, emotional and behavioral traits. Here the entire group discussed and evaluated the presentation as to the soundness of the investigation, validity of the evidence, reliability of the witnesses, and feelings and attitudes of the labor relations supervisor, and the like.

Shortcomings Listed. From this sort of personal evaluation a constructive list of the shortcomings of the supervisor and the way he handled the grievance was taken, together with follow-up action to be taken, corrective action to be made in view of one's personality failings, and a follow-up report on the nature of the improvement made. Finally, the entire meeting was summarized by the author with special attention being devoted to the assessment of both the supervisor's strengths and weaknesses relative to the grievance and his own psychodynamics.

Before the next scheduled meeting the tape recording of the previous meeting was played back by the author and reviewed. This proved to be a most helpful procedure because these playbacks often led to the isolation and identification of other personality and mechanical shortcomings in the presentation. The presentation of Supervisor Einer provides an excellent illustration. A careful study of his recorded presentation revealed the following findings which were missed by the group, and which were "news" to the supervisor himself: (1) of the 39 questions which were directed at him, he never allowed any of the supervisors to complete their questions before he began to answer back; (2) he invariably reacted to certain key words with alacrity, e.g., "you didn't find out . . . ," "shouldn't you have . . . ," (3) he referred to the union or union representatives with the adjective "damned," e.g., "that damned steward," or this "damned union"; (4) his manner in dealing with line employees was always deprecatory and sardonic; and (5) in response to asked questions, he oftentimes allowed his answer to be both discursive and desultory, seldom getting at the crux of the matter.

This use of a group therapy approach in the attempt to understand the relationship between one's personality dynamics and the manner in which he wrestles with job-related problems is finding a gradual acceptance in industry. Inherent in this acceptance is the belief that a problem situation

cannot be separated from the person (or persons) involved in it. As a result of this series of meetings with the labor relations supervisors, and a half year training program which followed, the personal effectiveness of supervisors was increased as measured by the rate of grievance disposition which was nearly doubled over an eight-month period.

2. Dual Allegiance to Company and Union-Packinghouse Workers: A Swift-UPWA Study in a Crisis Situation, 1949–1952 *

Theodore V. Purcell, S.J.

After the rise of vertical unions in the 1930's, most American mass production workers found themselves members of two partly overlapping, partly cooperating, often conflicting industrial organizations: their local union and their company plant. Both company and union are usually in competition for the loyalties of the worker. It is important to know how the dual and conflicting presence of company and union affects the attitudes and motivations of the worker who is between the two and a member of both. Does the American worker offer a basis for converting the opposition of company and union into harmonious opposition?

Some people think that the worker's dual allegiance to company and union is impossible: Solomon Barkin (1) says this concept "does not stand up"; Carroll Daugherty and John Parrish (2) say the workers "give the union most of their affection." A certain executive of Swift & Company (5), implying that union allegiance denies company allegiance, wondered why his employees went back to the UPWA after losing the long meat-packing strike of 1948, saying: "What is it about the Company they don't like?"

It is important to know what the working people themselves have to say about the possibilities of dual allegiance and whether or not they offer a basis for converting the opposition of company and union into harmonious opposition.

Our recent three-year study of the Chicago plant of the leading meatpacker, Swift & Company, and Local 28, a key local of the United Packinghouse Workers, CIO, is one of the early research efforts to get the answers on dual allegiance from the working people themselves. This

* Reprinted from *Personnel Psychology*, 1954, **7**, 48–58, by permission of the author and of Personnel Psychology, Inc. Dual allegiance problems are extensively examined in the author's recent book, *Blue Collar Man*, published by Harvard University Press.

study was made during a crisis period in the life of Local 28: the aftermath of a severe strike, a power struggle between the Local and the International UPWA, factionalism in the Local and control of the Local by the Communist party.

In this study I interviewed over 385 packinghouse workers, including foremen and union leaders, going among them as both psychologist and priest. If anything, this latter role seemed to give me a curious position of neutrality between company and union. At any rate, almost all the workers relaxed and spoke freely once the interview was under way. I graded each of them on a scale from one to five on their degrees of company and union allegiance.

Since this research explores the concept of dual allegiance, it is important to define what we mean by allegiance. Here allegiance means: an attitude of favorability towards the company or union as institutions, or general approval of their over-all policies. While the word allegiance does not perfectly describe the attitude we abstract from the interviews, it seems to serve better than loyalty, identification, endorsement or approval. Allegiance does not mean complete satisfaction with every aspect of the company or the union, with the pay, job, incentive system, foremen, gang, or with the union leaders, dues, meetings, policies, and so forth. These things will influence allegiance, but they do not constitute it. Nor do we mean, necessarily, loyalty in the sense of strong emotional attachment such as union leaders and company executives often have. But allegiance will have a definite effect upon behavior nevertheless. Dual allegiance simply means approval of the existence, objectives and over-all policies both of company and union. It does not necessarily mean obedience to the immediate collective bargaining demands of either organization. It would be possible to strike or to scab and still have dual allegiance.

This research asks three basic interrelated questions:

1. Will the average worker actually have dual allegiance to, and find the satisfaction he requires from, both company and union?
2. Will the worker have allegiance which is necessarily dual, in that he says his wants can be satisfied only by *both* organizations?
3. Will the worker's allegiance to one of the two organizations in the plant community pull him away from the other organization, thus straining his dual allegiance? Or will the allegiance he gives to one organization not noticeably affect the allegiance he gives to the other?

Before talking about dual allegiance and giving our answers to the three questions, we should discuss briefly the two components of dual allegiance. First, company allegiance. Company allegiance we found to be a clear fact in the Chicago Swift-UPWA plant community. If the results in Table 1 look too good to be true, remember that company allegiance does not mean satisfaction with everything. A man might dis-

like his foreman, or a Negro might complain of some discrimination and yet clearly have company allegiance.

Foremen and right-wing union leaders had a degree of company allegiance of 1.6, between favorable and very favorable. The sample of union stewards was favorable and even left-wing union leaders were slightly favorable. We find that the old timers have greater company allegiance (1.43) than the short-service workers (1.73), and the women (1.32) have more than the men (1.62). It is interesting to note that union membership makes no difference and that union men have just as much company allegiance (1.6) as non-union men.

Table 1. Distribution of Attitudes toward the Company (random, unstratified sample, $N = 202$)

	Degree of Company Allegiance	N	%
Very favorable	1.0	85	
	1.5	25	
Favorable	2.0	68	
	2.5	9	
Neutral	3.0	13	
	3.5	1	
Unfavorable	4.0	0	
	4.5	0	
Very unfavorable	5.0	1	
More or less favorable (company allegiance)	...	..	92
Neutral	...	..	7
More or less unfavorable (disallegiance)	...	..	1

The workers give many reasons for their over-all approval of the company: fair treatment, good foremen, pay, pensions, sick pay, and so forth. But significantly the reason given as most important to the people is steady work. Swift provided steady employment security and this was a major factor in the company allegiance of its employees.

Secondly, we found that union allegiance was also a clear fact. (Table 2.) One hundred per cent of the union stewards and leaders have union allegiance, understandably enough, but even a majority of the foremen have such allegiance. In addition, an analysis of variance shows us a significant difference between colored (1.75) and white (2.45) in their attitudes towards the union, the Negroes having much more union allegiance. This represents a complete reversal from the old AFL Butchers' days of 1920 and 1921. Of all the groups only the long-service women both colored (3.19) and white (3.44) have no positive allegiance to the union as an institution at all. They are indifferent or opposed to the idea of a union.

The people give many reasons for their union allegiance, such as holiday pay, wage increases, "back pay" on disputes, and so forth. But the most important reason by far is that the union gives them job protection and status through the grievance procedure and seniority. Curiously, we see here very similar reasons for both company and union allegiance.

TABLE 2. DISTRIBUTION OF ATTITUDES TOWARDS THE UNION (RANDOM, UNSTRATIFIED SAMPLE, $N = 202$)

	Degree of Company Allegiance	*N*
Very favorable	1.0	69
	1.5	15
Favorable	2.0	65
	2.5	10
Neutral	3.0	17
	3.5	1
Unfavorable	4.0	6
	4.5	3
Very unfavorable	5.0	16
	Rank and File (%)	Foremen (%)
More or less favorable	79	57
Neutral	8	16
More or less unfavorable	13	27

What is the relationship between the attitude of union allegiance which we have found and actual behavior towards the union? First, we have that behavior towards the union which the employee says in the interview that he practices. This we have called "participation in the union." This participation includes such behavior as reading union literature, using the grievance procedure, wearing a union button, talking about the union during lunch and rest periods, voting in the union elections and going to meetings. If we put the workers into 12 cells or boxes by sex, race and service and then arrange the boxes in their order of union allegiance and do a rank correlation with their degree of union participation, we find a positive correlation of .86. The colored men of middle service are the most active in union participation and also have the greatest amount of union allegiance. The white women of long service have the least union allegiance, and also participate in the union in the least degree.

We have also a significant observed fact about union behavior that is quite independent of the interviews and of what a man says his behavior is: namely, actual membership in the union as indicated by the

check-off lists. Whether or not a man performs the act of joining the union, signing a card and agreeing to the check-off is surely an important form of behavior towards the union. Again we find a high rank correlation between those groups which have the most union allegiance and their percentage of union members. The figure is also around .86. The colored women of short service are the most unionized and third in their union allegiance. The white long-service women are the least unionized (13%) and the least favorable to the idea of a union. While other factors affect one's joining a union, such as attitudes towards the union leaders, it is clear that union allegiance is also a key factor. The attitude of union allegiance which we have abstracted does apparently have some predictive value about behavior towards the union.

We come finally to dual allegiance itself. In answer to the first two questions we ask, we find that the employees do have dual allegiance and they do believe in *both* company and union as institutions. (Table 3.)

Table 3. Dual Allegiance in the Chicago Swift-UPWA Plant Community ($N = 202$)

	%
Unfavorable to both company and union	0
Neutral to both	0.5
Favorable to one and unfavorable to the other	13
Favorable to one and neutral to the other	13
Positively favorable to both (dual allegiance)	73
Stewards with dual allegiance	88
Foremen with dual allegiance	57

The most important figure in this table is that 73%, nearly three-fourths of the men and women of the plant community, do have positive allegiance to both Swift & Company and to the UPWA. This is all the more remarkable, as we said, in view of the crisis through which Local 28 was passing at the time. For most of those who fail to have dual allegiance fail to have allegiance to the union. These are mostly whites or long-service women. A high percentage of the stewards (88%) have dual allegiance, the stewards being quite union-minded. Even a slight majority of the foremen (57%) also have dual allegiance to both company and union (with clear though moderate union allegiance).

We come now to our third question: Will the worker's allegiance to one of the two organizations pull him away from the other organization, thus straining his dual allegiance? Or, will the allegiance he gives to the one organization not noticeably affect the allegiance he gives to the other? We want to know whether the dual allegiance we found is under any stress or strain. Our findings are that dual allegiance is not under a strain for most workers, but it is for a few.

In the cases of the two groups most identified with their respective

organizations—the stewards and the foremen—we find that their official role certainly does tend to pull them away from the opposite organization, though we remember that even they generally have dual allegiance. Regarding the rank-and-file, their dual allegiance is not under great strain. Our evidence for this is as follows: First, if we do a rank order correlation among the 12 sub-groups of the plant community, we have only a moderate negative correlation (—.48). This means that the order of company and union allegiance of the 12 groups moves moderately in opposite directions, the group most favorable to the company tending to be least favorable to the union, and vice versa.

Secondly, we note that the extreme groups are short-service men and long-service women. Other groups are not much affected. We note that sex and service tend somewhat to affect attitudes towards company and union in opposite directions.

Thirdly, we note in only a few individual interviews the pull of one organization drawing the man away from the other. To take one employee for example: Amos Marker (to give him a fictitious name) does show such a pull. Marker has less company allegiance than the average worker because he feels that "the company is working against the union" and he is a very loyal union man. We estimate that for about two-thirds of the production workers, dual allegiance is not under strain.

Finally we come to what is perhaps one of the most interesting aspects of this study. How can this dual allegiance possibly exist in the dynamic, crisis situation in which we find it? Does his dual allegiance affect the behavior of the worker torn between the "contradictory expectations" of his company and union leaders?

The Swift-UPWA workers clearly oppose these contradictory demands in the sense that they are generally satisfied with their company leadership. They are dissatisfied with their 1949–52 union leadership (the aggressors in making the demands contradictory). Of the rank-and-file workers, 47% are unfavorable to their union leaders, 27% are neutral or indifferent and only 26% approve. The over-all average is 3.45 or moderate disapproval. The older white (3.9) and colored men (3.4) and the older white women (4.5) are the most unfavorable.

Why do these people have disallegiance for their union leaders? For four main reasons: 1) These leaders forced them into a strike they did not want; 2) their leaders were excessively anti-company in their policies and acts; 3) they were left-wing; 4) for whites and even some Negroes, they were too militant on Negro rights.

Here are a few comments: "That strike shouldn't have been.... The people didn't want to go out.... They're biting the hand that feeds us. ... I like good union, good for company and good for workers.... A union should be 50–50 for the company and for the union ... now a foreman hasn't got a say.... I like a union that is agreeable with the

company and with the bosses, not fighting the company all the time.... They never give rights to the company.... The District is run by Moscow. ... It's definitely red.... The union ought to confine their business to the union and leave out interracial housing...."

When the 1948 strike was called, the workers were overwhelmingly against it. Yet they did go out, no doubt because of fear of picket lines, reprisals at home, and scorn of their work gang to which they must later return. But picket lines were not violent and the entrance to the Yards at 43rd and Halsted was easy. One by one they returned to work, until the greater part scabbed before their leaders called off the strike. The local leaders were different. They also fought to stop the strike. But once their International called it, they obeyed its command. Yet even a few leaders scabbed, putting themselves into a position of severe role conflict.

After the strike, dissatisfaction was so great that union membership dropped from 95% to less than 60% of the bargaining unit. And nearly one-fourth failed even to have union allegiance itself. (The right-wing group have since rebuilt the Local.)

In view of this severe test put to our concept of dual allegiance, it is remarkable that we should find it existing at all—and even not under great strain, at least for the majority of the rank-and-file workers. They readily distinguished between their union and its leaders (as they do between the company and its foremen). Even while opposing their leaders, they would not think of being without their union. Seventy-five per cent tenaciously hold on to their union allegiance. Nor do Swift's advanced personnel policies woo them away from it. Worker Bill Shuett (fictitious name) criticizes the minority who yield to this:

> Since the strike of 1948, quite a few of the fellows refused to come back in the union. They say "Swift treats me all right. I been here 27 years. Swift never did me nothin' wrong." They love the company more than the union! It's those kind of fellows that pull the union apart!

Last year, with the strike five years behind and the Communist party expelled from control, the workers surely had even greater dual allegiance than we found four years ago. Union membership grew back to 95%.[1] However, the January, 1954, victory by the left-wing faction in Local 28 may again threaten the workers' union and dual allegiance.

What is the meaning of the dual allegiance that we have clearly found in this study? It means that the workers see no conflict in the co-existence

[1] Preliminary findings in a continuation of this research project, studying Local 12 of the National Brotherhood of Packinghouse Workers (Independent) and the Kansas City Swift plant, and Local 78 of the Amalgamated Meat Cutters, A.F.L., and the Swift-East St. Louis plant, strikingly corroborate the over-all Chicago findings at least on dual allegiance.

of their company and their union. But much more; they want neither one to try to destroy the other. They want their union to respect their management. They want their management to give the union its right to a voice in determining working conditions. They will not strike if the union tries "to put the company out of business," so to speak. They will not scab if the company tries "to put the union out of business." It is well for both labor and management leaders to recognize this dual allegiance of the worker if they want industrial peace.

Of course, strikes or scabbings over immediate collective bargaining issues (not involving the existence of either institution or its over-all objectives) may arise from time to time. Dual allegiance will not entirely prevent them or predict them. For instance, I am quite sure there was dual allegiance in the Chicago plant in 1946 when the workers struck over issues they believed in. There was certainly dual allegiance in 1948 when they scabbed over issues they did not believe in. I believe that general worker satisfaction would lead to scabbing rather than striking, should a plant-wide strike be called in Chicago in 1954. What would happen in 1964 is anybody's guess. The worker's relative degree of company and union allegiance will influence whether he strikes or scabs, should a strike be called. But factors quite apart from allegiance will have also a very important influence: the worker's opinion of the immediate issues; fear of picket lines or reprisals; fear of scorn of fellow workers, and so forth.

In sum, the dual allegiance we found in Chicago gives an important reminder that, unlike a few labor and management leaders, the rank-and-file workers want *both* their company and union to coexist. If their leaders recognize this desire, at least one source of industrial conflict should be diminished.

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3. Human Relations in Collective Bargaining *

Kenneth M. Thompson

Better human relations in industry is a goal of tremendous appeal to American management. The very words conjure a hopeful vision of a contented work force cooperating with management to achieve greater production. Nor is there much doubt that many employees actually are happier persons and more efficient workers as the result of the practice of human relations principles.

But in the enthusiastic rush of business executives to affirm such an unexceptionable goal there is a dangerous inclination to embrace ideas and concepts indiscriminately if they carry the label of "human relations." Indeed, the term has been defined by one group of prominent businessmen and social scientists (headed by Robert Wood Johnson of Johnson & Johnson) as "the sum of all contacts and connections between each employer and his employees." [1] Even more serious is the apparent tendency to look to better human relations as the potential solution for *all* problems of dealing with employees.

For the present at least, relationships with a *union* constitute the practical reality in most large-scale industries; dealings are conducted by *representatives* of both sides; and the annual negotiation of wages is a down-to-earth and sometimes tough procedure where, no matter how much understanding the parties may have of each other's viewpoints, the outcome is a compromise or balancing of *opposed strengths.* That, it seems to me, is the essence of collective bargaining.

Most of the principles of human relations have been developed in terms of direct management contacts with individuals and small groups. However illuminating they may be in such a context, the crucial question is *whether they will stand the test of actual experience in the mass-production industries where good relations means living successfully with an aggressive union.*

Confidential Interviews. That is the question I attempted to answer by

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[1] *Human Relations in Modern Business* (New York, Prentice-Hall, Inc., 1949), p. iii.

a series of intensive personal interviews with management and union spokesmen of the farm equipment and tractor industry. Like the other mass-production industries—steel, automobile, rubber, and electrical equipment—the tractor industry is characterized by large, profitable companies and young, aggressive unions. Employees were organized in the 1930's; and while it is true that the few years since then have not afforded time for stability and maturity to develop in management-union relationships, the fact remains that this is the actual situation in all of the most important segment of our industrial economy and as such it must be reckoned with for some time to come.

Participating in long, off-the-record discussions were key management negotiators for the International Harvester Company, Chicago; the Caterpillar Tractor Company, Peoria, Illinois; Deere and Company, Moline, Illinois; and the LaPlant-Choate Manufacturing Company, Cedar Rapids, Iowa; and bargaining spokesmen for the two unions representing tractor company employees, United Auto Workers (CIO) and United Farm Equipment Workers (UE).

In these interviews the focus was on the following popular assumptions about human relations and collective bargaining

(1) Nonincome objectives are more important to industrial employees than wages.

(2) Management and labor can work out "fair wages."

(3) Employee understanding of management and its problems results in good labor relations.

(4) Management flexibility in wage negotiation promotes bargaining success.

(5) Employer profitability is not a major barrier to constructive labor relations.

(6) Collective bargaining can be transformed into a program of employer-employee cooperation.

Because the participants all knew that they would remain anonymous, their views on these major issues are likely to be more candid, and therefore more significant, than the official public pronouncements of their respective organizations. The fact that the opinions of these practicing wage negotiators show frequent departures from the stereotyped positions with which management and unions are often identified is all the more revealing—so long as they can be relied on.

In this connection it should be noted that the careful cross-check questions included in the interview design reveal a high degree of consistency in the responses to each item. Of course, a good deal of prejudice is evident, but that too is only natural. After all, these men represent the interests of their own groups, and feelings are just as much a part of the problem as are cold logics; indeed, they often *are* the problem.

Now let us examine the reactions of these management and union representatives to the six assumptions being tested.

Noneconomic Wants. The assertion of the obvious truth that employees are not "economic men" has become a frequent theme in the mounting literature on human relations. It has been carried to the point where one would almost think that the worker wants such things as personal dignity, security, recognition, and participation *instead of* higher wages. Yet only three decades ago economic incentives were asserted to be the *prime* movers of employees!

Robert W. Johnson, whom I have already mentioned as a leader in the "human relations in industry" movement, has stated the new theme succinctly: "The most vital rewards, however, are those of appreciative recognition; if they are adequate, money becomes secondary." [2] Employee opinion polls are frequently cited as evidence of this secondary role of money. According to Peter F. Drucker, well-known management consultant: "Every study of industrial workers has shown that wage rates are not uppermost in their minds." [3]

Does such "de-emphasis" of money wages provide a useful guide to management in its present collective bargaining relationship with employees? Do the management and union representatives who carry on the actual negotiating of new labor contracts in American industry believe that nonincome considerations are more important to their workers than wages?

No Substitute for Wages. Tractor company negotiators are unanimous in the opposite belief: higher wages are more important to their employees than any combination of nonincome advantages. Other desires may be more compelling *at other times,* but "they won't meet the demand for higher wages at the moment."

In other words, when the union seeks a wage increase, there is no suitable psychological substitute. Nor will past action by management to increase worker satisfactions forestall union wage demands, especially when wage increases are being secured elsewhere. Only when the wage question is resolved satisfactorily for a given contract period—and the wage is never felt to be satisfactory while the union is seeking an increase —do the "many factors . . . the hundred other things . . . which are more important to employees than wages" come into effect.

One company negotiator declared, "Wages *or* nonincome considerations? I don't even relate the two." This dichotomy was characteristic of tractor negotiators.

Union negotiators of the tractor industry support management's orientation toward wages, but for a different reason. Union leaders are under continual pressure from the rank-and-file members to produce "results"; and wage increases are the "results." Therefore, wage demands are

[2] *Or Forfeit Freedom* (New York, Doubleday & Company, Inc., 1947), p. 129.

[3] *The New Society* (New York, Harper & Brothers, 1949), p. 76.

pressed upon management by union leaders with such urgency that money receives top priority.

Union leaders recognize, however, that there are many desirable non-income objectives. In fact, *the tractor unions want to teach their members the value of nonwage items.* (In their officers' opinion, "it's an educational job" to get industrial workers to appreciate any benefit not visible in their pay envelopes.) But until human relations experts can show that nonwage satisfactions dominate worker desires *at contract negotiation time,* tractor unions as well as managements will probably continue to give healthy respect to wages.

Individual vs. Group Needs. This management and union emphasis upon the importance of wages calls into question the validity of the use made of worker opinion polls. It is not surprising that workers rank psychological self-fulfillment ahead of money income when asked about the ideal characteristics of a job. Rather, the surprise is the interpretation sometimes placed upon such employee answers.

When an employee answers an opinion questionnaire, he is participating as an individual; he is considering his individual needs. He is not in the group situation which social psychologists of the human relations movement always stress as so important. Therefore, the answers of the employee *do not predict* how the employee will act as a member of his labor union at contract-negotiation time. This distinction is vital to managements seeking to maintain good human relations *within* a collective bargaining context.

Many a worker may desire, for example, more recognition of his job accomplishments. This is something, however, that cannot be guaranteed him. Moreover, goals such as personal dignity and job satisfaction differ in meaning, context, and importance with each individual. They can hardly be negotiated. Naturally a wage boost, which is tangible, understandable, definable, and presumably attainable through bargaining, has pre-eminence at negotiation time.

If American industry were completely reorganized with employee psychological satisfactions given priority over technical considerations, wages might then play a smaller role *at all times* in worker motivation. But this has not been attempted on any large scale in American industry; therefore, wages are still the most central issue in labor relations. And even if such a thoroughgoing reorientation of industry *were* to be undertaken, its effect upon employee desires for higher wages would remain to be proved; certainly, as things stand now, it can only be assumed.

"Fair Wages." Since wages are so important in present management-labor relations, the question arises: What wages should an employer pay to achieve willing employee performance, and how should these wages be determined?

That employees should receive a "fair wage" from their employer for

services rendered is a proposition with which few persons would disagree. How this fair wage is to be determined to the satisfaction of employer and employees is a more difficult problem. The Johnson report, *Human Relations in Modern Business,* does not specify a method of solution apart from the employer's assumption of responsibility, for all that it mentions "a proper wage," "a moral wage," "a family wage," "a decent wage," and "a fair wage" at various points.

National labor policy, as expressed in the Taft-Hartley Act, supports collective bargaining as the preferred way of settling wage problems. Does that procedure actually arrive at fair wages for industrial employees, which apparently is society's virtually unanimous desire? Or has a task been assigned to wage negotiators that is impossible to fulfill?

Acceptable Settlements. Both management and union men doubt that their bargaining efforts result in fair wages. Rather, collectively negotiated wages are viewed as merely the best settlement acceptable to both sides at a given time. "Acceptable is the word," according to one management spokesman; while a labor leader remarked that "fair wages are a *should* proposition." Another labor representative, acknowledging that "fair wages" and acceptable settlements are necessarily different, said:

"The definition of a fair wage depends upon whether you're getting it or giving it."

Such union statements recognize an essential distinction which human relations advocates tend to ignore: Wages are cost to employer and income to employee, and what is fair income to an employee may vary markedly from what is fair wage cost to his employer. The union leaders and management spokesmen participating in this study have their own differing ideas of what a fair wage *should be.* But neither side expects collective bargaining to meet fully its concept of a fair wage.

At the same time, collective bargaining is not held to be deficient for failing to accomplish what is viewed as impossible. The wage negotiators of the tractor industry see collective wage determination as "a job, and you do it the best you can." As one management spokesman said:

"It's a potful of human forces at work in all sorts of directions. The skill and strength of the forces determines the result."

This executive's capsule appraisal of collective bargaining is strikingly similar to the more elaborate statements being made by a growing number of university labor economists—men like Lloyd Reynolds of Yale, Charles A. Myers of MIT, Joseph Shister of Buffalo, Frederick Harbison of Chicago, and Benjamin M. Selekman of Harvard.

No Practicable Alternatives. Union representatives firmly believe no other method of wage determination would come closer to a fair wage. Management negotiators, although not so emphatic about collective

bargaining's efficacy, are agreed that no other method appears practicable.

Management and labor alike oppose government declaration of what wages should be, except in temporary periods of national emergency. They feel that dictation by government fiat would not solve the problem of fairness; it would merely impose an arbitrary standard.

Again, they feel that intervention by a private third party, as in arbitration, only transfers power from both participants in collective bargaining, leaving the question of fairness unresolved. The injection of the Wage Stabilization Board panel into the recent steel industry controversy illustrates the difficulty of securing agreement on a definition of fair wages.

The rejection of these alternatives leaves only the present, admittedly imperfect, process of reaching joint agreement on wages through mutual exploration and negotiation.

The Problem of Values. This pragmatic approach to collective negotiation is in contrast to the growing emphasis placed upon the responsibility of negotiators for achieving fair wages. Sumner Slichter illustrates this other orientation when he states, "If collective bargaining is to command respect, it must be an attempt to determine what is fair." [4] Various criteria are then suggested by Slichter to guide negotiators. But the essential question remains unanswered: How can a fair wage be established until the values which constitute "fair" are shared by both parties in negotiation, and how can such values be shared when the work situation and life experience of the two parties differ?

Little attention has been paid by human relations advocates to another fundamental aspect of the problem of "fairness." The fair-wage solution is inextricably bound to the question of how the income from industrial production should be distributed. Employees certainly want a fair wage in the sense of being able to enjoy a decent standard of living. But they also want a fair *share* of the financial returns from what they help to produce—something quite different from recognition, security, and approval, however meaningful these may be.

Unfortunately, labor's fair share is not subject to precise measurement, because the differing social values of management and labor provide unlike scales of measure. Perhaps this difference in values between management and labor is a reflection of the different basis upon which each participates in the distribution of industrial income.

A claim that fair wages can be provided employees is actually a claim that labor and management share the same set of values. In the tractor industry both management and union spokesmen recognize that such agreement on values is highly unlikely. What is "fair" has admittedly not been determined, because "fair" is a question of divergent human values whose unification awaits the unification of American society itself.

[4] *The Challenge of Industrial Relations* (Ithaca, New York, Cornell University Press, 1947), p. 138.

Understanding. If management and workers just understood each other, would not the wage problem and other management-labor conflicts be eliminated? "Understanding" has become one of the most overburdened words in human relations literature. It sometimes seems as though all problems in human relationships could be dissolved in harmony if only everyone understood everyone else!

Not that understanding is unimportant; far from it. But so much of the faith in the power of understanding goes further than that. It is based on the implied belief that understanding is identical with acceptance by others of one's own viewpoint. More specifically, as used by some human relations advocates, it means that labor should understand and *thereby* accept fully management's decisions and objectives. This interpretation has been clearly stated by H. H. Carey, management consultant:

"But the basics for management in the human relations field are also U. A. W. —Understanding, Acceptance and Willingness. In the field of management action, it means doing the management job in such a skillful way as to make sure that employees fully *understand* management's position on the particular problem involved; that employees generally *accept* management's solution because they know that management has given careful consideration to all phases . . . ; and finally, maintaining a cooperative environment that engenders in employees a real *willingness* to go along and do a real job." [5]

Applied to industry's problem of achieving harmonious collective bargaining, how valid are these assumptions?

Overriding Considerations. Management and union negotiators are extremely skeptical of the degree to which understanding produces agreement in collective negotiation. They are favorable to better knowledge about the other party—"it helps"—but they raise many practical objections to the assumption that agreement will result from even *complete* understanding by both parties.

One reason for the failure of knowledge to lead to union-management accord was described by a top-management executive in the following terms:

"You could get full understanding from the union bargaining committee, but know that they would not accept it—because of the political consequences. Things happen that lead a union to the position where it can't accept a thing, even if it's right."

This awareness of the political nature and needs of the union organization is quite acute among management representatives. Another company official observed that "other things override the facts," referring to such considerations as the threat to union security by a rival union and contending political factions within the union membership.

[5] "Engineering the Invisible," *Advanced Management*, March 1952, p. 25.

The flaw in the "understanding = acceptance" equation was also emphasized by union leaders. As stated by one of these negotiators:

"It doesn't make any difference how well you understand—that has nothing to do with what's acceptable to your people. . . . The more you understand, perhaps the more ground there is for disagreement. . . . Your people don't see it as you do."

How much good does it do for union officials to understand that a company may be unable to pay higher wages when the members judge them on the basis of their success in winning wage concessions as large as those secured by another union in that area or industry? In such a case the company's financial "facts" may be less than compelling to the union leader who must live up to his constituents' expectations. He cannot forget that dissatisfied members vote in union elections; appreciative management men do not.

Divergent Goals. A final and most serious charge against the "understanding theory" of human relations is made by both management and union spokesmen: *In the absence of common goals, understanding will not produce acceptance.* The wage official of a leading tractor manufacturer remarked:

"Regardless of understanding, union and management are going in two different directions. What's good for the company is not necessarily good for the union."

It is true that both parties are interested in the source of industrial income—production. But such mutual interest in production values does not lead to agreement on the distribution of that value, the control of production, or the relative power of management and union.

An awareness of divergent union and management goals exists among union representatives, as well as management spokesmen of the tractor industry. In his discussion of this problem one union official declared:

"We think we know about the company's financial status—but we don't like high profits."

As a matter of fact, such understanding may actually lead to a more complete repudiation of management. This will occur whenever union leaders discern more fully management positions or views which are opposed to their own goals and ideas of "right" and "fairness."

Economic Education. These insights into negotiators' viewpoints have a vital bearing upon the success of communications and economic-education programs. Underlying the initiation of many of these programs by management there seem to be the following assumptions:

(1) Management's own goals and values are "right" for everyone.

(2) Lack of cooperation on the part of employees indicates lack of understanding of management's position.

(3) Lack of understanding stems from ignorance of the "facts"—i.e., the facts as management sees them.

(4) These "facts" can be communicated or imparted to employees by economic education.

(5) As a result, employees will accept management's viewpoint as their own.

Each of these five steps, it should be emphasized, is merely an *assumption,* something taken for granted. And the conclusion has not been proved valid any more than the initial assumption—fundamental to the whole process—that management's position is "right." For knowledge of the "facts" to lead automatically to "acceptance" depends upon *prior* employee agreement with management on goals and values; yet it is the very absence of such agreement which creates the call for understanding!

Whether "communications in industry" programs can produce the effect which management desires has been a much neglected question. But judging by *Fortune* magazine's recent investigation, employees are not listening to management's communication efforts.[6] They cannot be expected to when, as reported by the negotiators interviewed in this study, they do not share management's values of what is right and fair.

Agreement between management and labor is the usual accomplishment of collective bargaining over wages and conditions of employment. Such agreement is certainly facilitated by a fuller knowledge or understanding of the other party's problems and views. *But it is not based on the type of understanding which means acceptance of the other party's goals and values.* Such workable agreement, achieved through mutual exploration, remains the primary task of managements which deal with unions.

Flexibility in Negotiations. If collective negotiation plays such a vital role in human relations in industry, how can it be conducted more successfully?

Management has often been criticized for taking uncompromising positions in collective wage negotiations and sticking doggedly to them. The union, in contrast, is cited as having a remarkable ability to shift ground, engage in open field running, and strike compromises. It is suggested that if management would also learn to be more adjustable to changing bargaining circumstances, better results would be attained; at least the likelihood of deadlocks would be minimized, and the agreement process facilitated.[7]

[6] "Is Anybody Listening?" September 1950, p. 77.

[7] See Lee H. Hill and Charles R. Hook, Jr., *Management at the Bargaining Table* (New York, McGraw-Hill Book Company, Inc., 1945), p. 255; see also R. C. Smyth and M. J. Murphy, *Bargaining with Organized Labor* (New York, Funk & Wagnalls, Inc., 1948), p. 65.

Will greater management flexibility contribute to more constructive collective bargaining?

Company Responsibilities. Management negotiators of the tractor industry, while generally agreeing that the union position in negotiations is more flexible, discount its desirability for their own purposes. Management, it is stressed by company spokesmen, has obligations to stockholders, customers, suppliers, and the general public, as well as to employees. The interests of these groups must be represented, as well as the needs of management itself, for efficient control of the enterprise. As one company official observed pointedly, "When the company says something, it has to live with it."

Management fears that greater flexibility on its own part would establish dangerous union expectations that the company could be pushed even further in granting union demands; in other words, that if management's word comes to mean "maybe more," the company may be forced to sacrifice legitimate stockholder and customer interests by union leaders who believe "it is just another bluff."

Tractor management men therefore favor a rather definite position at wage negotiations—but not a dogmatic, unrealistic one. Rather, management spokesmen advocate a stand arrived at by careful assessment of employee needs, company requirements, and the forces shaping the union's demands.

In sharp contrast, the union is pictured by management representatives as an organization relatively unfettered by the multiple responsibilities of the employer. As one company negotiator described this labor freedom:

"The union's one objective is to satisfy its constituents. It's political. Also, it must maintain and enhance its own leaders' prestige. Otherwise, it does not have specific objectives. Management has."

This company viewpoint of the union is summarized tersely by another management executive, "They're not givers, but receivers, and receivers can always be flexible."

Union Centralization. As a matter of fact, even the flexibility of the union was questioned sharply by one management negotiator. In his view, the union local of a large national labor organization, once its wage program is formulated, is less flexible than management at negotiations. He said:

"Unions are so highly centralized that they practically write the script for local bargainers."

Centralization of decision-making power in labor relations seems to be increasingly characteristic of industrial unions. National wage policy is formulated by union headquarters officials for the approval of the union's annual convention. And the national union, which charters the locals, exercises many powers of supervision. In the case of the United Auto

Workers (CIO), for example, every single contract negotiated by a union must be approved by national officers. Furthermore, national field representatives usually participate actively in local negotiations.

The fact that national union counsel and direction are often solicited by local union officers, and often prove beneficial to union members, does not gainsay the centralization of power. The development since World War II of wage patterns set by key bargaining settlements has introduced rigidity in local union wage demands, as employers in many industries can affirm from their own experience. When union leaders demand "the pattern or else . . . ," regardless of the employer's local situation, the need seems to be for reasoned flexibility on the part of the union as much as management.

Logical Difference. Union negotiators of the tractor industry are certain that they are more flexible in wage negotiating than management, "that keeper of the vested interests which resist change." Yet one union official can see no virtue in having management become less definite in its negotiation position. Interestingly, this union leader prefers the very steadfastness in bargaining which students of industrial relations tend to decry as obstructing industrial peace! Referring to fixed bargaining positions taken by management, he declared:

> "That's the way I'd do it, if I were on the company side. . . . I'd rather bargain with a company that says: 'This is it; there just isn't any more!' "

There is a fundamental recognition by the union spokesmen that management's greater inflexibility in wage negotiations is logical and perhaps necessary. On the other hand, management negotiators seem to accept the relatively greater union adjustability because it serves union needs. There is little tendency to seek alteration in these respective roles.

Tractor industry negotiators find a functional explanation for this divergent union and management behavior: As long as the union seeks to initiate changes which can be secured only through management territory, the union team is likely to try to run toward its goal faster than the defending management team thinks is right and proper—and in such circumstances management flexibility is certainly not required by the rules of the game.

Profitability. Perhaps highly profitable companies can afford the luxury of labor discord which would bring financial ruin to profit-shy firms. Likewise, it is possible that labor unions dealing with such profitable firms can entertain wage demands and contract positions which a less favorable financial situation would render impossible. The question arises as to the actual impact of profitability upon management and union behavior in collective bargaining.

Human relations writers have been reticent about the role of profits in labor relations. But, even assuming that employees have been com-

pletely emancipated from their economic-man status, does it follow that the economic factor of profitability is irrelevant? Certainly the profitability of an industrial firm is part of the total situation within which management and labor live, work, and negotiate new contracts. Therefore, it must have some definite effect upon human attitudes and hence upon behavior in industry.

That profits set boundaries to the wage gains which are possible for labor to secure through bargaining is recognized by both parties, though with different results. Management tends to stress the ceiling set by low profits, while seeking to exclude higher profits from bargaining consideration. As Sumner D. Charm, personnel relations writer, has stated:

"But a company should not be charged exorbitantly more just because it can pay exorbitantly more. The real limit that the profit picture of a company must set up is how much it can *not* pay." [8]

Labor, as wage receiver rather than payer, tends to enter negotiations with the opposite viewpoint, thus producing a conflict of interest over the treatment of company profits. And this is precisely what happens in the tractor industry.

Role of Competition. The profit position of the companies of this study has generally been favorable over a considerable period of time. The possibility of severe market price competition and low profit returns is therefore a theoretical matter to most of the management negotiators. This may explain the uniform reluctance of tractor company spokesmen to discuss the possible effect of vigorous price competition and lowered profits upon the quality of wage negotiations.

Quite a few union spokesmen, however, have frequently had some experience in dealing with other, less financially favored companies and industries. These labor negotiators are generally agreed that intensive price competition produces a more factual approach to wage negotiation by *both* parties. As one union representative concluded:

"When a company is in a tight situation, it's more truthful. So's labor when it's in a flooded labor market. . . . When they've got it [profits], we feint and spar around. . . . The same with the company."

Another union leader advocated greater price competition, even if that should give the union less bargaining leeway:

"It's a healthier situation if it's more competitive. . . . Competition has an adverse effect on wages, but in general it's better for everyone."

The admission by tractor union leaders that price competition and lower profits limit their own actions is in itself evidence that profitability

[8] *Wage Policy for Management* (New York, Funk & Wagnalls, Inc., 1949), p. 186.

permits latitude for experimental "feinting," and that, whether desirable or undesirable, "ability to pay" is an important factor in American wage negotiations.

Positive Approach. When a company's profits are substantial, the union representing its employees seeks to share these profits, preferably through wage increases. In the resulting contest over the *real* financial status of the employing firm and the reward which should go to labor, both management and union are inclined to exaggerate their respective claims. What are the "facts" which should guide the negotiation of these conflicting interests?

Payment of dividends to management's employers, to the stockholders, *and* payment of wages to the union members depend alike upon profitable operations. When profits are nonexistent or a firm is operating at a loss, there is, therefore, a mutual need to increase production income. It is under such conditions that most of the successful union-management cooperative programs to increase production and reduce costs have been launched. But once the financial crisis is weathered, growing profitability again allows union and management the latitude to engage in dispute.

It is not to be implied that financially successful companies are necessarily destined to have turbulent bargaining relationships with their unions. There are certainly outstanding examples in American industry to the contrary.[9] At the same time, the union leaders of the tractor industry (management abstaining) definitely believe that profits backfire in the area of collective bargaining relationships.

Certainly, managements seeking good industrial relations must investigate further the question whether profitability per se is a factor detrimental to workable and constructive collective bargaining. An affirmative answer by other industries would imply that more thought and effort should be given by top management toward making profits play a *positive*, rather than negative, role in management-labor relations. Such a positive role seems essential to the continued well-being of a profit-propelled industrial system.

Cooperation. It is often pointed out by business spokesmen that collective bargaining—for all that it consumes a prodigious amount of time and energy of management and labor representatives—is concentrated solely on dividing a "pie" of productive wealth of fixed size. How much better it would be for both labor and management, so this popular business analogy runs, if they would expend their joint efforts on increasing the size of the "pie"—thus producing more wealth for all to share. And if this were the case, presumably management-labor teamwork to increase productivity would render collective bargaining less important.

The route to greater labor interest and cooperation in the successful

[9] See Stuart Chase, *A Generation of Industrial Peace* [New Jersey, Standard Oil Company (New Jersey), 1947].

operation of industry has been described by Alexander Heron, Stanford University professor of human relations, in these terms:

"If we want workers to work as a team, to work willingly and well, we must give them the right to think. . . . We must welcome the expression of their thinking and let management decisions be influenced by it. We must even delegate some decisions directly to the workers; for instance, decisions on all phases of safety, on some or all phases of house rules and discipline, on many phases of technological changes." [10]

What, then, are the prospects of such cooperative programs in American industry where management deals with industrial unions?

Management Prerogatives. Management representatives of the tractor industry do not believe that a transformation from a competitive bargaining relationship to one of shared responsibilities is possible. More important, they are actually opposed to such a possibility. As one management official expressed the industry's opposition to joint labor-management programs:

"If that ever comes about, it will be because management has thrown in the towel. And I hope that day never comes. . . . Production is management's responsibility."

This is characteristic of the fundamental attitude which explains management opposition to cooperative programs in the tractor industry. Cooperative production activities would require labor participation in management decision-making, or at least prior consultation when decisions are formulated; and that is anathema.

The proposals of human relations writers are often described in terms of the cooperation of small work units with management. The exact role for unions in such programs remains blurred. Yet, if there is to be full cooperation by the work force, the union which represents its members must participate and provide leadership. And if the union is left outside a program of management dealing with individual employees or employee work units, the union has no alternative other than opposition; otherwise it cannot maintain its effective existence.

Surely no industrial union in America's mass-production industries will preside quietly over its own loss of functional importance. A successful program of greater *worker*-management cooperation is therefore necessarily also a program of *union*-management cooperation. This central role of the union in such a labor-management program is likely to provoke, if it is not already existing, the same management opposition that is found in the tractor industry.

Nor is there likely to be a change so long as there is no strong economic

[10] *Why Men Work* (Stanford University, Stanford University Press, 1948), pp. 175–176.

compulsion for cooperative production programs, such as would be provided by a poor profit picture. The profit returns of the tractor industry have generally been liberal in the postwar period, and the predictions for continuing favorable financial positions are optimistic. Moreover, since technological improvements have seldom been impeded by the unions in this industry, there is little room for making gains in this area by fostering cooperative labor-management programs.

Again, because maximization of profits is not necessarily the dominant goal of modern management (as distinct from ownership), the possible augmentation of company income through greater employee interest in the business is not an imperative factor. This is especially true if management officials feel, as in fact they do, that such possible gains in profit would be purchased at the expense of their own powers and controlling functions.

Union as "Gadfly." Union representatives are also either extremely doubtful of the value of such a cooperative program or are absolutely opposed to such "collaboration." Significantly, union leaders are inclined to oppose the transformation of a strictly bargaining relationship to one of cooperation for the same basic reason that motivates the objections of management officials. They fear a loss of their own powers of leadership.

In his study of *Collective Wage Determination,* Z. Clark Dickinson, University of Michigan, clearly defines the problem which cooperative programs pose for many American union officials:

> "And whenever a leader in a group normally opposed to our own gets to talking and acting in ways which we can almost wholly approve, the probability is very strong that he will soon be repudiated by his own constituency." [11]

The role of the union as the management "gadfly" has become so accepted in the tractor industry that union leaders find it difficult to conceive of a cooperative role. Such a role, they believe, would jeopardize the allegiance of their membership. Furthermore, they realize that management, while accepting the present function of unions, definitely would not welcome the broader role of cooperation in production problems.

This evaluation of the situation is strongly evident in the statements of every union representative of this study. One union negotiator expressed his fear of any cooperative program in these terms:

> "The membership would lose confidence in us. . . . We'd be killing ourselves off gradually."

This same repudiation, coupled with doubts of the value of cooperative efforts to labor, is evident in another union spokesman's declaration:

> "It converts the union into a company instrument. . . . No company will agree to properly reward employees for their extra efforts."

[11] New York, Ronald Press Company, 1941, p. 29.

Thus, both union and management spokesmen oppose any move toward cooperative production programs. Each group is fearful for reasons of personal and organizational preservation, while minimizing any potential advantages of a positive nature.

Negotiation as an End. Is it not possible that management-union negotiation may be a long-run asset rather than a temporary expedient? Could it not be a fundamental human relations process rather than a way station on the route to a mythical goal of complete cooperation?

Instead of being viewed as an interim, deficient arrangement, collective negotiation is seen by tractor negotiators as a workable, continuing process. Collective bargaining meets the basic needs of such unlike organizations as the International Harvester Company and the United Auto Workers (CIO). Although neither companies nor unions of the industry are fully satisfied, it is a basic truth that human wants are unlimited and, therefore, insatiable. If it is a useful method of accommodating the admittedly divergent goals of tractor managements and unions, then it is good relations, human or otherwise.

Perhaps tractor managements and unions *should* have attitudes which would make more cooperative relations possible. This study has sought to discover what attitudes and relationships *exist* without judgment as to their desirability. Despite the inevitable frictions and disappointments of reaching agreement through real differences in opinion and objective, no tractor spokesman looks for a better solution of his organization's problems outside the bounds of collective negotiation.

Companies similar to those covered by this study may well arrive at a similar conclusion: the needs of both management and union are best served by a continuation of present collective bargaining relationships.

Conclusions

It has been the premise of this study that the foundation for industrial relations is established by national labor policy as collective bargaining. Whatever helps promote this process of achieving mutual agreement is therefore a step toward good industrial relations.

We have examined the applicability of several widely accepted human relations concepts as experienced in a large American industry. Three findings of basic importance to all companies seeking better management-labor relationships emerge:

(1) Wages are a prime, if not the most important, element in employee satisfaction in unionized industry as it is now constituted. This means that management efforts to provide psychological rewards for workers, no matter how desirable in themselves, cannot serve as substitutes for collective wage agreement.

(2) Better understanding of management problems by labor will not neces-

sarily lead to employee acceptance of management's proposed solutions. Programs to insure a mutual exchange of ideas and information are helpful in clarifying areas of agreement and disagreement, but understanding, however complete, does not guarantee labor's identification with management's position in the absence of commonly held values and objectives. Therefore, communication and education programs in industry should be utilized with an awareness of their necessary limitations.

(3) Cooperation through shared responsibilities for production cannot replace collective bargaining as the basic management-labor relationship, where both parties fear the loss of power and organizational control. Cooperative programs presuppose a degree of mutual interest which is contrary to the practical reality in much of American industry. Collective bargaining recognizes that the interests of management and labor are not identical, but seeks workable agreements nonetheless.

For the strengthening of the collective negotiation process in industry the following suggestions are offered for top-management consideration:

(1) The aim of collective negotiation should be to arrive at wages and other terms of employment *acceptable* to both parties for a given contract period. It cannot determine "fair wages." Efforts to settle the question of wages with finality or to meet ethical standards of "fairness" are not likely to be rewarded because the standards vary with the observer.

(2) By taking a reasonable and supportable position at the outset of negotiations, management can win union respect, while meeting management's obligations to nonlabor groups. Flexibility based on indecision and opportunistic bargain-seeking may undermine union confidence in management and jeopardize essential company interests.

(3) Company profitability may render the task of reaching collective agreements with labor more difficult. A positive approach must be taken so that the union regards profits as a goal of its own interests as well as of management's.

Human relations, based on the study of human behavior and social organization, is a relatively new area of interest and investigation. It has many facets in which worth-while contributions are being made by serious students in the various branches of the social sciences. The few concepts which have been examined and discussed here are by no means illustrative of the many fields of fruitful exploration which fall beneath the broad umbrella of human relations. A similar clarification of all the terms and concepts in this amorphous area would do much to eliminate the posturing of fallacious ideas among the genuine discoveries of the science of human behavior.

Only by turning to the laboratory of industry itself will answers to many vital questions of human relationships be discovered. Even if the findings made there are counter to what might be wished, management will still profit from the answers. Better relations in American industry will develop most firmly upon a foundation of knowledge about what men *actually* believe and do.

4. Dilemma of the Industrial Relations Director *

Dalton E. McFarland

Almost every industrial relations executive today, when he can be persuaded to discuss his most perplexing problems, will name as one of his major concerns the achievement of better understanding between himself and top-line management. The fact that such an executive is frequently responsible for effective communications between workers and management appears to aid him very little in establishing and maintaining his own effective channels of communication with other executives, particularly his own superiors.

Greater attention needs to be given to the nature of the relationships between industrial relations executives and other key management men. Toward this end, four questions will be considered in this article:

What do industrial relations executives mean when they say they need "better understanding" from top management?

What prevents them from achieving a more desirable level of understanding?

What can industrial relations executives do to improve this understanding?

What can top-management executives do, on their part, to meet their responsibilities to industrial relations men more adequately?

Better Understanding

When an industrial relations man expresses a desire for "better understanding," he is frequently reacting to the fact that he does not have the respect and support of top management to the extent that he needs it. How can the personnel man, no matter how able individually, carry his full measure of responsibility if his superiors do not understand their role in providing an environment in which this need is satisfied?

Personally and Jobwise. It is true that in most companies the industrial relations executive is regarded highly by his superiors. But regard for him as a person is not the same thing as respect for his area of management responsibility, for his professional attributes and his managerial success. That is what he really needs. If he is consistently thwarted in his aim to

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establish industrial relations as an effective instrument of management action, he will feel frustrated in spite of the respect of other executives for him as a person.

A striking example of difficulties brought on by lack of respect for industrial relations occurred in the Northwood Corporation, a manufacturing company employing approximately 2,500 workers in its main plant and three branch plants. (The names of this and other companies in this article have been disguised, but the situations described are actual and represent the author's firsthand observation.) Strangely enough, this lack of respect was imbedded in a context of strong company effort to elevate the status and influence of the industrial relations function in the company:

Northwood had experienced an unusually high turnover of personnel executives—four men in seven years. Early in 1952 the position of personnel director again became vacant.

The vice president, who managed the company for its owners, decided to make industrial relations a top-level function in the company. Accordingly he sought a man with higher qualifications than he had previously demanded. And he succeeded in obtaining a man with several years' experience in labor relations—a man who had never before held the sole responsibility for industrial relations in a company, but who had worked closely with a number of excellent industrial relations directors and had carried a great deal of the burden in contract negotiations.

The new industrial relations executive was encouraged by the company's expressed policy of placing greater emphasis on the industrial relations function. The company was paying him a salary nearly three times that of his predecessor and had given him responsibility for industrial relations in the branches as well as in the main plant. His position had previously carried the title "Personnel Director"; it now had one of loftier implications—"Director of Industrial Relations."

The director thought that he should not make radical changes in the organization and policies of his department. He avoided being too openly critical of the way people did things. Instead, he busied himself learning about the company. He gradually introduced better systems and methods in the operations of the personnel office.

Within six months, however, he began to sense reservations about his status among the other executives of the company. He particularly noted his exclusion from the company's board of control, which carried out the major planning and policymaking decisions. The board of control was under the chairmanship of the vice president who had hired him. The heads of the sales, finance, and engineering departments were members. The director felt that if the company really intended to advance the role of industrial relations, it should name him to this board. The vice president proposed such a move, but the board rejected it.

At the same time that the director was blocked in his efforts to play a part in the company's policymaking activity, his fellow executives invariably spoke

highly of him. They told others that he was bright, alert, and very personable. They felt sure he was doing the company a lot of good, and that "he would be able to put the union in its place."

While this man may have been too eager in his desire to reach top policy-making levels, he apparently was accepted as an individual. Yet the board's rejection did not square up with his understanding of the position when he accepted it; and the board's behavior in keeping him from a more influential place in the affairs of the company was inconsistent with the avowed intention of top management to increase the prestige and importance of industrial relations. The inevitable result of such a situation is frustration on the director's part and, in turn, deteriorating relationships with the senior executive.

Based on Knowledge. The kind of support the industrial relations executive needs consists of more than verbal pats on the back or, as is sometimes the case, words spoken by top management out of sheer desperation in a tight bargaining situation.

As the head of a unit which is generally organized on a staff basis, the role of the industrial relations executive is primarily that of a planner, adviser, and policy maker; he has little or no direct authority over the people who must ultimately act. (As one industrial relations man put it, "My title should have been 'Sales Manager,' because all I ever do is try to sell people on things.") Accordingly he needs a feeling of confidence in the ability of his superiors to understand and evaluate correctly what he is doing. He wants a chief who makes his supporting decisions on the basis of his own good judgment, not on the basis of expediency or through lack of knowledge of what needs to be done.

Most top executives acknowledge that their support of the industrial relations executive is vital. Many doubtless feel that, whenever the industrial relations director needs support, he gets it. However, in many instances they give it halfheartedly or tacitly; they assume that their support is obvious. At the same time, their actions frequently negate their good intentions. An example of this was observed in connection with an attitude survey in the Vedex Company:

The training manager asked the director of industrial relations to approve a survey among 2,000 supervisors to find out their reactions to a training course they had just gone through. The director requested the training manager to submit a tentative questionnaire and promised the help of his own staff. The director then had his assistant go over the proposed questionnaire with key production executives concerning its contents. The production men agreed to the survey; they even added a few questions of their own to it.

Completed forms were returned by 40% of the supervisors. The director's assistant prepared a report for members of middle and top management. But when the report reached the production executives, particularly the superintendents to whom the supervisors reported, there was a general outcry against

the survey. Although the report was not as well prepared as it should have been, its general significance was inescapable: the supervisors were extremely critical of their superiors.

As a result of angered protests, the director of industrial relations recalled the report for reconsideration. The revised version was more accurate, but the conclusions were essentially the same. By the time the new report appeared, the furor had died down. The report was filed and forgotten.

The main lesson of the Vedex Company case is not in the question whether the attitude survey was correctly carried out or not, but in the fact that the apparent approval of top-management executives vanished at the very time it was most needed.

In this instance the director of industrial relations found that an important project could be rejected and subverted by the very people who stood to gain the most from it. Moreover, this rejection was not based on good management judgment, nor even on the legitimate basis of defects in the survey itself, but rather on the fact that the survey offended the prestige and pride of certain executives. In other words, they did not understand that the purpose was to help them. It is not hard to imagine the effect of this situation on the morale of the industrial relations staff, and the director especially.

For Successful Relations. I do not mean to suggest that top management should not be as tough-minded about the work of the industrial relations staff as about any other function. Of course the industrial relations director should be expected to pull his own weight. He does not need to be coddled or patronized; he can get results without such special backing. It is no less true, however, that he needs the benefit of a helpful working relationship with his senior executives. In this respect his needs are no different from those of the head of any other department, whether production or accounting or anything else. Executive effectiveness is largely a function of executive relationships.

In too many cases top management fails to appreciate the truth of this. Even if (unlike the management of the Vedex Company) the senior men back the industrial relations director on his decisions, they still may not give him the effective working support that he needs to make *good* decisions. To illustrate, let us consider another incident from the experience of the Northwood Corporation:

Five months after the director of industrial relations assumed his post, the union contract came up for revision and extension.

The director, his task complicated by uncertainties stemming from the rapid turnover of industrial relations executives in the past, anticipated a difficult time. He saw several major weaknesses in the organization and operation of his own division. He noted also that department and division heads in the shop did not think constructively about problems of industrial relations. Shop supervisors were not carefully selected or well trained, so that poor relations with

the union were intensified at that level. Finally, the contract to be renegotiated was loaded with excessive strictures upon the company. If the director of industrial relations ever needed effective support from top management, he needed it now.

Because the union had adopted the strategy of delaying negotiations, the current contract was going to expire before a new agreement could be reached. On the day prior to the expiration of the contract, the director heard indirectly that the vice president was leaving town, ostensibly to visit another branch but actually to take a short vacation. The director went to see him to report on the state of negotiations and to get further instructions. He informed the vice president that negotiations were reaching a critical stage and that he could not be sure what would happen when the contract expired. The vice president said he saw no reason why he should cancel his plans to leave town. He told the director that he thought him capable of handling anything that might come up and to "go ahead and do as you think best."

The vice president's attitude toward industrial relations activity and toward the director himself had unfortunate consequences. Instead of coming out of this conference feeling that top management understood the problem, the director felt only a lack of understanding and support. He believed it shortsighted as well as thoughtless of the vice president to "flee" at such a crucial hour, and he resented what he interpreted as unwillingness to take at least a part of the responsibility for what might occur in a matter vitally affecting the whole company.

In a later interview, the vice president expressed a strong feeling that the director should assume complete responsibility for whatever happened between the company and the union; that he was unduly nervous because he had never before handled negotiations on his own; and that he should stiffen up so that he would not lean so heavily on the judgment of others. The existence of such feelings tended to inhibit the growth of a more effective relationship with his director.

It is significant, too, that the vice president's attitude induced changes in the industrial relations people's behavior that put them in an unfavorable light:

> The senior executive tended to keep conferences with the director at a minimum. The director frequently took the key members of his negotiating team to meetings with the vice president, first instructing them to "tell the story without pulling any punches; we've got to make him see how important this is." In such conferences the vice president frequently treated the group paternalistically; he gave the impression that, although he was busy with important matters, he would give them this opportunity to "blow off steam."
>
> Most of the sessions degenerated either into personal diatribes against the local union officers on the part of the staff or into boasting about their accomplishments as negotiators. Since the vice president seldom had any sincere words of praise or encouragement for the negotiators, they naturally felt compelled to fill in the gap themselves.

Blocks to Understanding

Why do unsatisfactory relationships develop between the industrial relations director and his superiors? Why do these relationships persist and survive? Why does top-executive behavior so frequently differ from intentions in the industrial relations phase of management? A meaningful answer to these questions requires analysis of the influences affecting the industrial relations director and the executives for whom and with whom he works. These influences will be discussed in terms of limitations which retard the effective work of industrial relations men and of top executives.

Inadequacies of Top Executives. Personal limitations and weaknesses are not a monopoly of either industrial relations executives or senior line executives; but they are more troublesome when they apply to the latter group, if only because they are not usually recognized for what they are.

One of any top executive's important tasks is to make a continuous appraisal both of his accomplishments and of his deficiencies. Executives do this with varying degrees of diligence, accuracy, and insight; some cannot face their shortcomings at all. Such top-management men pose a serious problem for industrial relations executives, for this weakness leads them to mask their fears and limitations with a façade of aloofness or superiority.

This seems to be at least a part of the explanation of the behavior of the vice president in the Northwood case. To cite a further illustration of his rejection of final responsibility:

> The union had been dragging out discussions of relatively unimportant non-wage items in the contract. The director's plan was to tell the union boldly that on the basis of ability to pay (backed up with specific evidence) the company could not possibly grant even a small wage increase, and in this way to change the pace of negotiations and bring them to a speedy conclusion. On the other hand, failure to bring the move off successfully could precipitate a strike, so the director felt he should have the vice president's approval before going ahead.
>
> The vice president listened politely to the director and his associates while they presented their analysis. He then brought the conference to an unexpected close by saying: "You fellows know more about these things than I do. Go ahead and do whatever you think best." When the director emerged from this meeting, he said to his associates: "This sure puts me in a hell of a position. If I do what we planned and it doesn't work, I will be damned by him. If I don't do it, and later he decides that I should have, I'll still be damned."

That is exactly the position the vice president wanted the director to be in, for then the blame for whatever might go wrong would not be his but his subordinate's. In other words, the vice president did not know what was the right thing to do, and he took this way of hiding his de-

ficiency—hiding it, that is, not only from others but also from himself. This interpretation is in line with this particular man's background; there is reason to believe that he had risen from the ranks more by accident than by being well equipped for a broad-gauge job involving decision making.

In an area as difficult and important as the management of a labor force, the senior executive cannot afford to appear ignorant—yet unfortunately he often is. Unconsciously he may try to make it appear that, after all, industrial relations is one of the lesser activities in the organization—that he is so fully occupied with more important things that he expects the industrial relations director to do the job without bothering him. He may withhold his support and encouragement from the industrial relations executive who happens to be ambitious and who energetically devotes himself to the job; he may become wary and overcautious and begin to act emotionally rather than logically. Needless to say, all this heightens the difficulties between the industrial relations executive and senior management.

Newness of the Field. Another major obstacle to good relations between the industrial relations director and top management lies in the fact that industrial relations has emerged comparatively recently as a formally organized function. Top-management executives are frequently men with long tenures, who have worked up to their positions primarily through their own initiative and ability. What they know is largely the product of their own experience. They have succeeded for the most part without formal attention to the industrial relations field.

Some of these men tend to see in the field the mere creation of new jobs—jobs with considerable glamour and popular appeal but with little substance. As a result they become skeptical in their appraisal of industrial relations activities. They are constantly on guard against new industrial relations techniques. Although they realize that the industrial relations executive has the primary responsibility for helping them make better labor and personnel decisions, they often receive the suggestions and plans of the director with strong reservations.

Difficulty of Justification. Those who occupy top-management positions quite naturally expect their subordinates to prove their worth. They ask them to show tangible evidence that their work is of value, and that it contributes economically to the company's objectives. While one cannot sensibly quarrel with top management's desire to evaluate industrial relations in an economic sense, it is well to recognize that continuing pressure of this kind may set up a barrier between the director of industrial relations and top management. For example:

In the Northwood Company, a foreman discharged a worker who was a member of the union's bargaining committee. The basis of the discharge was that some of the workers in the department had reported to him that the work-

man in question had told them to cut down on the amount of work they were doing. The union fought the case through grievance channels to arbitration. The decision of the arbitrator was that the man had in fact done what the company claimed, but that, since he had an unblemished record up to that time, he should be reinstated after a layoff of two months.

The director felt the decision to be one of substantial victory, inasmuch as the arbitrator stated that the workman had done a reprehensible thing deserving of punishment. Moreover, it was rare to succeed in disciplining a union official, and the extent of the punishment was fairly severe. Considering this a hopeful sign of progress, he naturally was disillusioned to discover that the vice president scored the decision as a total loss. The vice president said he couldn't understand why the company had to "take such a beating from the union"; and the director commented to his associates when he emerged from a discussion with his superior, "The worst part was, I couldn't seem to get him to see that we really won that case."

The industrial relations executive faces a constant challenge to prove himself; the burden is on him. If top-management executives push him too hard to get him to prove his worth, the industrial relations director may become oppressed with the feeling that they doubt his worth and underestimate the value of everything he does.

The problem of the industrial relations director in justifying his activities and in "selling" his ideas is intensified by the abstractness of the material with which he must work, and by the difficulty of expressing human relations problems and solutions in precise and tangible form. Many of the results of the industrial relations director's work will be of a long-run nature, whereas what top management considers in its evaluations is largely data on short-run achievements.

Despite the complexity of the human problems with which he deals, pressure from above sometimes leads the director of industrial relations to try to formulate his reports, his plans, and his proposals in specific terms. Thus many industrial relations executives lean heavily in their reports on the statistics of turnover, absenteeism, number of grievances settled, number of arbitration cases won, and so on, whereas a real understanding would be better served by other means. Tangible measures, though immensely valuable for many purposes, fall far short of what a top-management man needs to see in order to get a thorough understanding of industrial relations work.

This is particularly serious because line executives are likely to overlook the more subtle aspects of an industrial relations man's job and professional development. To illustrate:

In the Vedex Company, the head of the production department observed, when he passed through the industrial relations office, that one of the staff members was reading a periodical. He continued on his way into the personnel director's office, and shortly thereafter the director emerged and told

the offending staff member, "The superintendent didn't like seeing you reading. I know you were looking at a professional publication and that it's part of your job, but you'd better duck it when you see him coming."

The superintendent's blind antipathy toward reading on the job, which was doubtless justified as far as production workers were concerned, prevented him from understanding its value for those for whom the creation and use of ideas is of utmost importance.

Directors' Limitations. For many difficulties of communication between top executives and industrial relations directors the staff men themselves are personally responsible. One might well ask, for example, just why the personnel director in the foregoing case responded so meekly to the superintendent's criticism of the reader in his office—and, on top of that, revealed to his own staff member that he felt he was not strong enough to stand up for what he knew was right. Why not openly defend the position of his staff member? Why not use this occasion to improve the understanding of the production man concerning industrial relations?

The personnel director may have overlooked the opportunity, but it is probable that even if the idea had occurred to him, he would have passed it over. The company in question happened to be a concern where the line part of the organization is dominant; in this respect it is typical of hundreds of other companies. The production executives carried the major weight in making decisions. There was a hushed reverence for them. The personnel director had started with the company under its apprenticeship program and was steeped in its tradition of a strong line management.

In view of all this, it is not entirely surprising to see the personnel director react as he did to the whims of the production superintendent. The fact remains that his reaction did nothing to ease relations between his department and others or to promote respect for industrial relations work in the minds of fellow executives.

A complicating factor observed in the attitudes of some industrial relations directors is that they feel that the value of their work should be taken for granted. Since they realize the difficulty of producing tangible proof of their contributions, anything they do along these lines is often halfhearted and slipshod. They are more likely to conform to the letter than to the spirit of what top management expects in the way of substantive "results." They find it difficult to go in turn to their subordinates with requests to justify their activities.

Poor Administration. Because of the general lack of comprehension of the industrial relations field on the part of line executives, the director who does only a reasonably good job can often get by. At the same time, if he operates his department carelessly, he is not likely to advance his executive career very fast—particularly if his superior is the kind of man who is an able judge of performance and quick to spot inadequacies.

Just as a smooth-running department has a favorable influence on people at all levels in other departments, so the department which makes mistakes, wastes time and money, and affronts the sensibilities of people in other parts of the organization will inevitably reflect unfavorably on the industrial relations director's function. An example of such a situation occurred in the Lexington Company:

Employment was handled by an employment manager who reported directly to the director of industrial relations. The employment manager had a narrow concept of his department's function, so that department and division heads got only a small part of the service they would normally have expected. Moreover, the services were performed in an unimaginative, routine, and frequently careless way. In spite of unfavorable comments of high executives, the industrial relations director did not feel that he could remove the man, who was nearing retirement, and he took no action to improve the situation. As a result of the continuing poor discharge of the employment function, the whole department lost favor.

Union Orientation. Another kind of behavior on the part of the personnel executive which can impede his relationship with top management involves spending an excessive amount of time dealing with the union. While it is a major objective for the director of industrial relations in a unionized company to work out a satisfactory continuing relationship with union representatives, too much zeal in doing so may provoke the criticism of management associates and superiors. This occurred in the Deckler Corporation, where the director of industrial relations was relatively new on the job:

He had spent his first two years placing primary emphasis on correcting unfavorable relationships with the union. He opened wide the door to conferences with the union representatives, feeling that free discussion of timely problems would establish the company's good intentions and achieve mutual trust. Consequently, his time was largely spent in top-level conferences with the union.

The constantly reiterated answer whenever he called—"Sorry, the director is in conference; could he call you back?"—began to annoy the company president. The director himself reported, "One day the president asked me if I were a member of the union or a member of management. He said I spent so much time with them he was beginning to wonder. Of course, he knows that our union problems are clearing up. Still, it has kept me in there with them an awful lot of the time . . . and my boss resents it."

An industrial relations man whose background includes a period of influential union leadership is particularly subject to continued reservations by top-management and fellow executives concerning the strength of his management outlook. Unless such an executive makes a special effort to eradicate signs of union sympathy (and this admittedly is a difficult thing to do), he will experience criticism and antagonism, and his effectiveness

will eventually decrease as the respect and support that he needs dry up.

Cumulative effect. Most important to remember is that any mistakes the industrial relations director makes, any ineptness he demonstrates in performing his job, leave deep and ineradicable impressions on top management which affect not only him but his whole department and the function it is set up to perform. The cumulative effect of prolonged poor administration of industrial relations by incompetent directors can make a top executive overcautious, suspicious, and distant toward any replacement, no matter how capable.

As the industrial relations director of the Northwood Corporation—where, it will be recalled, there had been a turnover of four personnel department heads in seven years—pointed out: "When a top-management man gets burned as many times as he [the vice president] has, he's bound to give the industrial relations director a hard time."

Recommendations

Now, what does all this add up to? Generally speaking, it is clear that the director of industrial relations and the company's top executives share a continuing relationship. The success of this relationship depends on the ability of the industrial relations director to achieve an understanding of top-management thinking and behavior, and to bring top management to an understanding of his particular field. To this end five precepts are especially important.

Especially for Personnel Men: *1. Improve Communication.* The responsibility for achieving better communication and harmonious relationships with top management lies with the director of industrial relations. He must take the initiative in building up the kind of relationships with top management which will earn him the required respect and support. While there is no quick, short recipe for an industrial relations director to follow, the research reported in this article permits some insight into what he might do and what he could well avoid doing.

The director of industrial relations should realize that improved rapport with top management involves a long, pedestrian process of educating higher executives to the meaning of industrial relations decisions and to their influence on the company's operation. A great deal of damage may sometimes be done by an impatient effort to hurry the process. Moreover, a director should take account of historical conditions which have influenced top management in his company, so that his efforts to achieve better understanding will be realistic.

The industrial relations director must remain fully aware of the problems involved in his communication with top management so that he skillfully scrutinizes his efforts in that area before he takes action. He should also take time to analyze his communications *ex post facto* to see

if the effects have been what he intended. Constant attention to such details will reward him by changes of a fairly permanent character in the attitudes and understanding of top-management officials. Without a conscious effort to accomplish improved communication with top management, the industrial relations executive will never be sure his work is effective even if his superiors seem to approve of it.

2. *Improve Report Writing.* In improving his relations with top management, the industrial relations director might well consider the technical improvement of his written reports. Most educated persons tend to assume that their communications are concise, clear, and accurate. In fact, the reverse of this is often true. Moreover, many of the communications coming out of the industrial relations department are prepared by subordinates, whose work may be passed on only hurriedly or not at all by the industrial relations executive.

An example of faulty communication from the industrial relations department to top management is provided by the Vedex Company attitude survey, described earlier in this article. After the first report was distributed, the mathematical computations were found to be erroneous. Furthermore, although the report had indicated strong dissatisfaction with top management among the supervisors, the specific conclusions were not logically supported by the data. The percentages and figures were so confusingly utilized that persons trained in working with attitude surveys were not willing to accept the results without further investigation.

One of the biggest blunders was that those responsible for the survey report assumed that it would stand on its own merit. They did not feel it advisable to prepare the recipients in advance for possible criticism. Consequently those affected were thrown off balance when they received the report; defensive behavior recounted above was not forestalled. When the industrial relations director realizes that any communication he releases is going to affect others in the organization, and it is not just an isolated event, he has gone a long way toward resolving his communications problem with top management.

3. *Cultivate Top Management.* A further suggestion for the industrial relations executive is that he cultivate his personal relationships with higher executives, particularly his own boss. Some writers have pointed out that other executives resent the amount of time industrial relations directors spend with top management. Yet the industrial relations director must recognize that it is essential for him to get sufficient time with his superior. Unless he has frequent contacts of considerable duration, he will find it difficult to develop in his superiors the understanding of industrial relations work required to produce the needed respect and support for it.

An effort recently was made in this direction at a leading university,

where one day of an institute for industrial relations executives was called "bring your boss" day. The industrial relations director and his superior came together in an environment conducive to thoughtful consideration of problems of special concern to both. The advantage was not merely that problems might be more readily solved. More significant was the opportunity for top managers and personnel executives to work on problems together and with access to university resources not ordinarily available. They could talk with one another away from work and free of interruptions and pressures of daily routine.

Such an opportunity is a golden one for an industrial relations director. A remark often heard at executive development conferences is, "This stuff is good all right, but I sure wish my boss was here to learn this instead of me."

Also for Top Management. *4. Provide Information.* Both the industrial relations director and the top executive have important responsibilities in keeping the other well informed. The senior executive needs to learn as much as he possibly can about what goes on in the industrial relations department, and to listen carefully to the ideas of his director. From the director he can learn much about his labor and personnel problems that will help him direct the over-all operation of his business. It is up to the director, therefore, to be prepared not only to highlight important problems whenever asked but to take the initiative, if necessary, in seeking opportunities to "talk things over" with his boss.

Such talks will also give the top executive an opportunity to express definite opinions on the various aspects of personnel relations so that his director will know how he feels. Although the senior man will want to avoid making decisions which properly belong to the director, he should at least give him the assurance that top management has thought its way through the company's labor problems. Such an assurance will in turn strengthen the director in his efforts to arrive at good decisions.

But the top executive, too, has a responsibility to provide information. He should keep his industrial relations director fully informed about matters that are certain to affect his area of responsibility. Some top executives are reluctant to disclose actual policies and decisions adopted and still more reluctant to explain the thinking behind them. Unduly cautious behavior on the part of an executive can seriously damage the effectiveness of his industrial relations director's work. For example:

> In the Northwood Company, once again, the board of control voted to expand one of the branch plants. The first that the industrial relations director heard about it was in the form of requisitions asking him to employ a number of new workers. The board had not only made this decision without consulting him as to the availability of the kinds and quantities of labor that would be required, but it did not even give him advance notice so he could prepare for the new situation.

Often the information which top management should transmit to the director of industrial relations is of a less specific nature. Some executives have asserted that industrial relations men have too little knowledge of over-all company problems, that they tend to exhibit the narrow outlook so frequently characteristic of the specialist. The incidence of this criticism suggests that top executives may be overlooking opportunities to help their industrial relations directors acquire valuable insight into the larger problems of the company. The initiative of the industrial relations director in helping top management understand his problems might well be matched by top-management initiative to see that he is more satisfactorily integrated into the organization as a whole.

From observations made during the course of the research reported here, there is substantial evidence that the picture of the industrial relations director as competent only within the limits of his field is not always fair. Often the industrial relations director is equipped by training, education, and experience to deal effectively with a very wide range of management problems. Given the opportunity to apply their talents and skills, many industrial relations men could materially help the executives above them. The top-management man who has such an industrial relations director in the organization would do well to recognize his merits and nourish his loyalty to the company.

With an active give-and-take of information between industrial relations and senior line executives, there is less likelihood of "boners" in actions by one group affecting the other. Fewer top executives will reach conclusions like that of one well-known business leader who emphasized, in a widely publicized Rotary Club speech, a "greater need for the manager to step over executives and foremen in an effort to reach the worker"—as a means of avoiding "a combination of government and labor which is socialism." Imagine the impact of such an attitude on the relationship between top management and industrial relations!

5. *Study Problem "in Depth".* Self-analysis and self-criticism are not easy. Habits of long standing make changes difficult. Yet the merest beginnings of intensive research into the nature of relationships between top-level executives and their industrial relations directors suggest that much is to be gained by objectively describing and evaluating these relationships. Studies of titles, salaries, and promotions of industrial relations executives yield insufficient knowledge; they are superficial for all but limited purposes. Basic insights can be derived only from studies "in depth" of the thought and behavior patterns of industrial relations executives and their associates.

Once executives realize that the *basic* problem for study is one of human relationships, as opposed to technical proficiency, salary levels, and other factors, they will have gone far toward solving or avoiding the

kinds of difficulty described in the preceding pages. From the research carried on as the basis of this article, it is evident that a cooperative, mutually respectful relationship between top management and its industrial relations department is the key to success. It will go a long way toward improving personnel relations and thus company operations in general.

Part Twelve: MARKETING AND CONSUMER RESEARCH

1. What Is New about Motivation Research? *

Daniel Starch

There appears to be quite a bit of confusion as to just what motivation research really is. The phrase is tossed around so freely that it is almost a fad for advertising people to use it. Apparently many people use the phrase without clearly understanding what it is they are talking about.

To clarify our thinking about it, let us keep distinctly in mind the difference between *problem* and *method.* Whether you are dealing with marketing or manufacturing, with atoms or attitudes, research starts with a problem. Then you try to find a method or methods for solving that problem.

Stated simply, the problem of motivation is to find out what causes people to behave as they do and, specifically, what sets off a given action. This problem is the same whether the action relates to Johnny's learning to hang up his coat or Susie's practicing her piano lesson. Or whether it has to do with buying houses or automobiles, soap or soup. Motivation research in human behavior is research which tries to answer the question, Why do people do what they do, what specifically triggers the action in a given situation?

This is the problem side of motivation research. How about the method side?

The methods by which the *why* of human behavior is studied have been developed and used as far back as psychologists have been studying the problems of human behavior. Part of the present confusion in popular thinking about motivation research has come about from the failure to understand that there are, broadly speaking, three areas or levels of motivation:

1. The rational, self-knowing area in which one is aware of what motivated his action and is *able and willing to tell why.*

2. The rational, self-knowing area in which one is aware of what motivated his action and is *able but unwilling to tell why.*

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3. The complex, hidden area in which one is not aware of what motivated his behavior and really *cannot fully tell why.*

Able and Willing to Tell Why. Here is an example of Area 1 motivation. A man has been looking for a year or so for a Dacron shirt other than white. He wants a colored shirt which has the easy-washing, quick-drying and no-ironing features. Glancing through the newspaper one morning his eye catches the word Dacron in an advertisement of a favorite store. Looking at it further, he finds that these are Dacron-cotton mixtures in different colors and that the same characteristics are claimed for them as for 100% Dacron white shirts, namely, easy-washing, quick-drying, no-ironing. This man knows why he wants the shirt, is conscious of the specific thing (an advertisement) which triggers the purchase act and is willing to talk about it. The method of motivation research to use here is direct questioning.

Able but Unwilling to Tell Why. An example of Area 2 motivation. Teddy or Tillie Teen-ager may say they use dentifrice because they like the taste. And that may be a *why* for it, but the more compelling *why* may be that Teddy thinks he can more certainly date Tillie. He may be aware of this but unwilling to openly admit it. Here a method of motivation research capable of uncovering the Tillie relationship must be used. A simple direct question entirely suitable for Area 1 is unlikely to be satisfactory here.

Cannot Fully Tell Why. An example of Area 3 motivation. A man may have used toothpaste X so long that he cannot really tell why he now buys it or why he did in the first place years ago. All he is aware of now is that he has gotten used to it, likes it and purchases a new tube because the last one is squeezed empty. However, the underlying reason may be that paste is not as messy as powder and is more convenient to put on the brush. Again the method of motivation research used must bring out the underlying reason which the user is unable to directly express.

In much, if not most, of our behavior more than one type of motivation in varying proportions is involved. In some types all three operate. The more difficult areas of motivation to explore are 2 and 3. Most methods used to explore motivation have been known and used for a long time in various fields of psychological research. Practically the only new phase is a more widespread application and adaptation of some of the more complex of these methods to the investigation of motivation of the buying behavior of consumers.

To explore Areas 2 and 3, such procedures as the probing and depth interview and projective techniques have been brought over from personality studies and clinical psychology where they have been used for many years. These procedures are now being adapted and applied to marketing problems. Previously, most *why* research in marketing was in Area 1. Much useful help should come from the use of these methods in

the study of consumer buying behavior. However, as often happens when methods are first applied to problems in a new field, early enthusiasm tends to outrun discovery of actual solid findings. Disappointment and confusion result.

Two Words of Caution. Motivation research is usually spoken of as being qualitative rather than quantitative. We must not forget, however, the qualitative findings must be expanded to find how important may be a given finding in the total picture of the marketing process. This must be done through means that quantify findings. A given trigger to action may be present, but whether it is potent with many or an insignificant number is an important question. It must be answered before qualitative motivation study findings can be translated into effective marketing action.

The other word of caution is also concerned with translating findings into action. Having discovered a strong motivating factor for a product, the form in which it is expressed in an advertisement can and does make a world of difference in the ultimate effectiveness of the appeal. Obviously the same motivating appeal can be expressed in numerous ways. One particular form may be far more effective than another. So a strong motivating appeal may be very weak when expressed in one form and quite likely less effective than a weaker appeal expressed in strong form.

Motivation research then is research designed to find the answer to the *why* questions in consumer buying behavior by adapting and using methods to explore the various motivating areas concerned in given problems.

The problems are not new and the methods, for the most part, are not new. What is new is applying the methods in new areas of behavior—in this instance, consumer buying behavior.

2. Subliminal Perception: Some Negative Findings *

Allen D. Calvin
Karen S. Dollenmayer

The recent reports in the popular press concerning the claim that stimuli below the level of conscious awareness can influence behavior have had remarkable repercussions with both Congress and the FCC investigating

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the problem. The claims by a commercial organization that they had succeeded in increasing the sales of Coca-Cola 18% and that of popcorn over 50% by flashing subliminal messages at 1/3000 of a second during a motion picture program was the principal cause of concern. The major television networks have responded by banning the use of such techniques.

McConnell et al. (McConnell, Cutler, & McNeil, 1958) have just completed an excellent comprehensive review of the experimental evidence relating to this problem. They conclude by saying, "One fact emerges from all of the above. Anyone who wishes to utilize subliminal stimulation for commercial or other purposes can be likened to a stranger entering into a misty, confused countryside where there are but few landmarks. Before this technique is used in the market place, if it is to be used at all, a tremendous amount of research should be done, and by competent experimenters" (p. 237).

Method: *Subjects.* Sixty female undergraduate students served as Ss.

Apparatus. A Gerbrands' tachistoscope. The lamps used for illumination in our model of the Gerbrands' tachistoscope are 4 watt, daylight, fluorescent lamps. These lamps are operated on an ignition voltage of approximately 250 volts d.c. and a filament voltage of 6.3 volts a.c. The normal operating current of each lamp is approximately 130 mils. There are four lamps in the tachistoscope, 2 for the exposure field and 2 for the pre-exposure field.

Procedure. The Ss were seen in individual experimental sessions where they were given the following instructions:

> We are interested in investigating the possibility of ESP (telepathy). I want you to look into this machine (Gerbrands' tachistoscope). Do not remove your eyes from the machine until I tell you to do so. In the machine you see a card with two circles on it. The left one is marked L and the right one is marked R. We want to find out if you can guess which of the two circles is correct on a particular trial. The correct circle will be so designated on the back of the card, but you, of course, will not be able to see the designation. After I say "ready" you will hear a click. I want you to tell me after the click whether you think the left or the right circle is correct for that trial. If you think that the left one is correct, say "left," and if you think that the right one is correct, say "right."

Half of the Ss were then told:

> I will tell you if your choice is correct or incorrect. There will be ten trials. Between trials there will be a brief pause while a new card is inserted. Are there any questions?

With each click the words "choose left" or "choose right" made up of block letters ¾ of an inch high were flashed in the center of the screen.

Whether "choose left" or "choose right" was flashed was predetermined by a Gellerman (1933) order. The correct circle on any trial was, of course, the one flashed in the message. At the conclusion of the experimental session, each S was asked for a verbal report.

A three by two factorial design was used. The Ss were assigned randomly to the conditions such that an equal number of Ss were in each condition. There were three exposure speeds, .01 second, .02 second, and .03 second and half the Ss at each speed were told when they were correct (hereafter referred to as the TWC Ss) while the other half (NTWC) were given no knowledge of the correctness of their choices.

Results and Discussion. The mean numbers of correct choices for each group are presented in Table 1.

Table 1. Mean Number of Correct Choices

Group	.01	.02	.03
TWC	4.9	5.0	5.4
NTWC	4.1	5.0	5.8

An analysis of variance was conducted and the over-all F was not significant. Other analyses indicated that none of the groups differed significantly from chance which, of course, was five correct choices.

Although none of the groups exceeded chance expectations, four Ss made nine or more correct choices. Making nine correct choices out of 10 is significant at about the 1% point if the S had been selected beforehand. All four Ss indicated during their verbal report that they had been able to read the words. One of the four high-scoring Ss was in the TWC .02 group, one in the TWC .03 group, one in the NTWC .02 group, and one in the NTWC .03 group.

In addition to the four mentioned above, six other Ss reported that they could read the words although usually not until the later trials. Their scores were 5, 6, 7, 7, 8, and 8. The rest of the Ss did not report seeing anything except the circles.

Our results thus indicate that under the conditions of the present experiment no evidence for subliminal perception was found. This obviously does not mean that subliminal perception cannot occur under other conditions, and since the commercial organization refuses to release the details of its experimental procedure (McConnell, 1958), no direct comparison between their findings and ours is possible. Nevertheless, it seems reasonable to assume that the striking findings claimed by the commercial organization at an exposure speed of 1/3000 of a second are due to some artifact and are not a genuine instance of subliminal perception.

Summary

Sixty female undergraduates served as Ss in a study designed to investigate subliminal perception. Speed of stimulus presentation and knowledge of results were varied in a three by two factorial design. No evidence of subliminal perception was obtained. Implications of these findings were discussed.

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3. A Psychometric Approach to Predicting Consumer Preference *

Purnell H. Benson

The Problem. This paper employs questionnaire data to establish functions from which predictions are made of the preferred frequencies with which foods are served on meals planned by the Quartermaster for military personnel. The type of approach has previously been described (Benson, 1955; Benson, 1957, pp. 67–94). It is an approach which can apparently be extended to consumer behavior involving specific quantitative or qualitative dimensions of foods or other products consumed in a planned economic situation or purchased by consumers in a competitive market.

Marginal utility theory is of traditional importance in formulating models of consumer behavior. Empirical application of this theory requires ordering or measuring states of utility, as satisfaction in use, about which consumers express personal judgments. Psychology and sociology, following the work of L. L. Thurstone, R. A. Fisher, and L. Guttman,

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have developed ways of observing and measuring such variables as utility and preference (Edwards, 1957; Guilford, 1954; Stouffer, *et al.*, 1950; Torgerson, 1958).

While the distinction between preference and utility may appear to be verbal, the distinction is apparent in the types of questions asked in consumer research. In preference inquiry the respondent is asked how much he would like to have the article in question, not how much satisfaction he experiences from it. Measurement of preference reflects not only degree of satisfaction but also the dynamics of habit, social pressure, advertising influence and any other factors which determine consumer choice. Questionnaire procedures yielding consumer preference data are intended to stimulate the actual situation in which the buyer makes his choices, although they do not always succeed in doing so.

Consumer preference can be defined as the motivating force to purchase or consume one product rather than another. By various scaling procedures a metric can be established with the data from categorical or paired comparison replies such that measurement of preference for stimulus A plus measurement of preference for stimulus B equals measurement of preference for stimulus A + B when A and B are independently consumed (Benson, 1958; Benson & Platten, 1956; Gulliksen, 1956; Thurstone & Jones, 1957). The additivity of preference measurements is found to be a necessary condition for maximizing total preference when preferences for commodities or properties of these are separately measured and the summation of measurements maximized. The need for additivity of preference measurements is encountered in the study described in this paper.

The serving of meals of maximum palatability within restrictions of nutrition and cost is an objective of the Quartermaster. Discovering the optimum selections and frequencies of serving for different menu dishes is not a simple research task. The possible combinations of foods at various frequencies of serving are almost endless. A preference survey to find out what particular menu schedule for a month's meals would be most acceptable might involve exhaustive collection of data. Instead of experimenting with various frequencies of serving in all possible combinations, a research alternative is to use a few selected frequencies to establish the functional relationship between degree of preference for a menu dish and the frequency with which it is served, and then to find the optimum point along this function for setting the frequency of serving. As Box (1956, pp. 495–578) has shown in mapping response surfaces for industrial plant output, the rational basis for optimization analysis is that far fewer data are needed to establish a mathematical function from which the optimum can be computed than would be needed to locate the optimum by trial and error testing of possible alternatives. The present study illustrates the prediction of preferred frequencies of serving from

preference measurements at selected points on the frequncy continuum. The immediate purpose of the study is to determine whether restriction upon physical capacity to consume must be taken into account in optimizing consumer preference.

Data Employed. A questionnaire was prepared which secured data

Table 1. Mean Preference Ratings for Servings of Menu Dishes When Served at Various Frequencies

Menu Dish	Frequency of Serving in Times per Month				
	1	4	8	15	30
Beef stew	1.56	.82	.28	.17	—.15
Grilled hamburger	1.83	1.47	1.06	.42	.38
Veal chops	1.68	1.17	.44	.46	.06
Meat loaf	1.67	.91	.29	.04	—.19
Fried fish	1.36	.82	.49	.03	—.60
Roast turkey	1.55	.86	.39	.04	.11
Steamed cabbage	.87	.34	—.11	—.28	—.42
Fresh string beans	1.79	1.14	.50	.44	.01
Fresh green peas	1.81	1.61	.81	.43	.22
Buttered beets	1.09	.80	.48	.07	—.18
Glazed carrots	.98	.64	.31	.11	—.41
Mashed turnips	.35	.04	—.08	—.30	—.66
Baked white potato	1.66	1.47	1.11	.52	.57
Boiled sweet potato	1.04	.89	.28	.07	—.23
Steamed rice	1.07	.71	.55	.33	.03
Vanilla pudding	1.26	.90	.46	.15	—.23
Cherry pie	1.39	1.13	.30	.17	—.01
Apple sauce	1.65	1.55	.71	.54	.40
Orange ice	1.12	1.05	.63	.45	.09
Chocolate cake	1.54	1.12	.47	.26	.31

Note. Standard error in mean preference rating ranges from .10 to .15 for the above values.

for establishing preference functions and which at the same time obtained information to validate predictions made from preference functions. The first part of the questionnaire asked respondents to report their degree of like or dislike on an 8-step categorical scale for having a particular food item served the next time when eaten at a specified frequency of serving. Twenty foods were included. The validation part of the questionnaire asked respondents to state their preferred frequency of serving per month if cost of the food items made no difference. While restriction upon cost is a limiting condition in menu planning, the present study investigated restriction upon capacity to consume when cost is not involved.

The questionnaire, covering frequencies from once a month to once a day, was administered to 120 personnel at the Quartermaster Food and Container Institute by a procedure in which each third of the sample reported their degree of preference for 20 food items at two different frequencies. Scale values were assigned to the verbal preference ratings by the computational procedure of Bock and Jones (1956) for assigning successive interval values. The verbal categories and their scale values are: "like extremely," 2.62; "like very much," 1.64; "like moderately," .97; "like slightly," .36; "dislike slightly," —.21; "dislike moderately," —.46; dislike very much," —.71; and "dislike extremely," —1.16. Mean preference ratings were computed for each of the foods at each of the frequencies of serving, as recorded in Table 1. The investigation of these preference patterns is an area being studied by Joe Kamen.

Analysis and Findings in the Prediction Test. The situation chosen for test is one where it is assumed that cost is not a restriction but capacity of the eater may be a restriction. Two hypotheses are set up.

(1) The preferred frequencies of serving of foods are found at the peaks of the preference functions for the foods.

(2) The preferred frequencies of serving are found at those points on preference functions of foods in a similar class, such as meats, vegetables, starches or desserts, where the slopes or marginal preferences of the functions are equal, subject to a restriction upon the total number of servings for the class of foods which the eater can consume in a month.

In testing these hypotheses we are concerned with the eater's total preference for all of the servings he consumes. This is obtained by multiplying the degree of preference for a single serving by the number of times per month that the food item is consumed. The preference functions from which optimum frequencies of servings are to be predicted are total preference functions. These are fitted to the data of mean preference ratings multiplied by their respective frequencies of serving.

One of the points used for fitting total preference functions is at zero frequency, for which the total preference is also zero. The other three points selected for establishing preference-frequency functions are once a month, four times a month, and eight times a month. The standard error in the mean preference rating on the successive interval scale for the sample in this study ranges from .10 to .15, with the larger errors arising in reporting preferences for servings at unfamiliar frequencies. When this error is multiplied by the larger frequencies, the distortion introduced is increased. Frequencies of more than eight servings per month were not used for fitting functions except in several instances of the prediction of peaks which otherwise would fall outside the range of points used. The functions fitted are of the form $Y = a + bX + cX^2 + dX^3$, where Y is the total preference and X the frequency of serving. Coefficients for the

functions fitted to frequencies of zero, one, four, and eight times per month are listed in Table 2. Since Y is zero when X is zero, a is zero for all of the functions. The functional relationships are tentative and can neither be assumed to apply outside the range of frequencies used to establish them nor to different samples of people.

Table 2. Coefficients for Total Preference Functions of Frequency of Serving

Menu Dish	Coefficients in $Y = a + bX + cX^2 + dX^3$			
	a	b	c	d
Beef stew	0	1.8705	—.3264	.01595
Grilled hamburger	0	1.9600	—.1325	.00250
Veal chops	0	1.8429	—.1611	—.00179
Meat loaf	0	1.9795	—.3236	.01405
Fried fish	0	1.5957	—.2496	.01393
Roast turkey	0	1.8443	—.3104	.01607
Steamed cabbage	0	1.0833	—.2225	.00917
Fresh string beans	0	2.0390	—.2571	.00810
Fresh green peas	0	1.8005	.0286	—.01905
Buttered beets	0	1.1962	—.1086	.00238
Glazed carrots	0	1.1110	—.1354	.00440
Mashed turnips	0	.4952	—.1557	.01048
Baked white potato	0	1.7081	—.0443	—.00381
Boiled sweet potato	0	1.0314	.0232	—.01464
Steamed rice	0	1.2357	—.1771	.01143
Vanilla pudding	0	1.3857	—.1271	.00143
Cherry pie	0	1.4076	—.0004	—.01726
Apple sauce	0	1.5824	.0929	—.02524
Orange ice	0	1.0967	.0350	—.01167
Chocolate cake	0	1.6671	—.1239	—.00321

Predictions of preferred frequencies of serving for the hypothesis of no restriction upon capacity to consume are given by the maxima of the total preference-frequency curves. The frequencies at the maxima, computed by differentiating the functions with respect to frequency and setting the derivative equations equal to zero, are recorded in the second column of Table 3. These predictions diverge from the reported preferred frequencies of serving by a standard error of 3.10 times per month.

In predicting optimum frequencies under a restriction upon total number of servings the eater is able to consume, we assume that a separate restriction governs each nutritional class of foods, such as meat dishes, vegetables, starches, or desserts. The aim is to predict the way in which a fixed total of servings is to be apportioned among meat dishes for optimum preference. Similarly, for vegetables, starches, and desserts, the objective is to predict how the total servings for each of these classes of

foods will be distributed among the members of each class. There is, of course, the larger question of how total servings of menu dishes for the month are to be divided among nutritional classes, such as between meats, vegetables, starches, and desserts. In order to attack this question, information would be needed concerning the quantitative and qualitative relationships of food servings in different classes to each other—information not available in the present study.

Table 3. Reported and Predicted Preferred Frequencies of Serving

Menu Dish	Reported Preferred Frequency	Predicted Preferred Frequency per Month:			
		From Maximum of Preference Function		From Relationship of Equal Marginal Preferences	
		Prediction	Error	Prediction	Error
Beef stew	3.12	4.09	.97	2.48	—.64
Grilled hamburger	4.76	9.54 *	4.78	6.53	1.77
Veal chops	3.94	5.26	1.32	3.78	—.16
Meat loaf	3.67	4.22	.55	2.69	—.98
Fried fish	2.99	7.09 *	4.10	2.71	—.28
Roast turkey	2.33	4.65	2.32	2.62	.29
Steamed cabbage	1.95	2.99	1.04	2.07	.12
Fresh string beans	5.81	5.28	—.53	4.29	—1.52
Fresh green peas	6.73	6.14	—.59	5.69	—1.04
Buttered beets	3.24	7.23	3.99	5.04	1.80
Glazed carrots	2.82	5.68	2.86	3.69	.87
Mashed turnips	.97	1.99	1.02	.74	—.23
Baked white potato	7.48	10.48 *	3.00	7.20	—.28
Boiled sweet potato	2.62	5.40	2.78	4.11	1.49
Steamed rice	4.22	13.18 *	8.96	3.01	—1.21
Vanilla pudding	3.00	6.07	3.07	4.46	1.46
Cherry pie	4.95	5.21	.26	4.54	—.41
Apple sauce	6.16	5.96	—.20	5.47	—.69
Orange ice	5.93	6.69	.76	5.77	—.16
Chocolate cake	4.76	5.53	.77	4.56	—.20

* These predictions were made from functions fitted to frequencies of zero times per month, four times per month, eight times per month, and fifteen times per month.

The problem of menu planners is how to fill a certain number of vacancies on the menu in an optimum way. There is no loss of realism in solving this problem if we start with a known number of vacancies to be filled, which is the capacity in servings to be consumed. Consequently the reported preferred frequencies of serving were totalled within each of the four classes of foods under consideration. Each of these totals was used as a restriction upon capacity to consume in predicting the preferred frequencies of servings for the food members within the class.

The predictions of frequencies for the individual foods are obtained by successive approximation, using trial values for the marginal preferences to determine corresponding frequencies of serving. When these frequencies are totalled they should equal the restriction upon total frequency of serving for the class of foods. If they do not, fresh trial values obtained by interpolation are substituted in the marginal preference equations. The solution can also be obtained graphically. The predictions with restriction on capacity to consume are given in the right hand portion of Table 3. The standard error of the predictions validated against reported preferred frequencies of serving is 1.11, computed with 15 degrees of freedom in the variance. The predictions fall individually within the sampling error attributable to variance in mean preference ratings from which the functions were obtained.

The improvement in prediction over using simple maxima of the preference functions is significant at the .001 point of confidence. The question arises of whether the gain in predictive efficiency is an artifact, due to using the mean frequency of consumption (from the total reported preferred frequency for the class of foods) as an aid in prediction. The efficiency of the mean preferred frequencies as predictors was therefore examined. If the preferred frequency of serving for the individual food is predicted from the mean of its class, the standard error of prediction is found to be 1.77. The improvement by using marginal preferences over class means is significant at the .05 point of confidence.

Limitations and Implications. On the substantive side, this experimental study indicates that physical capacity to consume is a restriction affecting consumer behavior toward foods. Further research is required to investigate the combined effect of physical and cost restrictions.

On the methodological side, the study shows that consumer choice along a quantitative continuum can be predicted with fair accuracy. Larger samples stratified according to homogeneous preference patterns may be expected to lead to improved results. In the present study the reported preferred frequency of serving used as a criterion of validity of prediction could be furnished by the consumer from his eating experience without difficulty. In multidimensional problems involving new products, the consumer is scarcely able to forecast his optimum mixture of qualities and quantities. This is the type of situation in which empirical mapping of the preference surface is useful in approximating the consumer optimum in advance. Such an optimum can later be validated in terms of the predicted behavior which takes place.

As is recognized in consumer research, questionnaire methods introduce biases of various kinds which cause results to deviate from those occurring in the buying situation. In the study described here, the biases introduced are probably similar for the prediction and for the validity check,

since both presuppose a similar deviation, if any, on the part of the consumer expressing judgments. In predicting consumer behavior by questionnaire studies, it is customary to adjust results for the types of distortion which previous buying studies have shown are needed. In employing the research approach advocated in this paper, calibrations should be made in preference functions according to base points provided by actual buying behavior.

The usefulness of preference patterns established by questionnaire data is found less in their accuracy than in the range of situations which can be described by mathematical formulation. When data for demand functions are limited to prices and quantities disclosed in past buying behavior, only a small segment of the potential response surface is defined. Usually this is too small a segment for predictions to be made about new product forms or distribution procedures. Factual studies can be used to calibrate results from questionnaire studies so that the two types of research perform a cooperative role in combining precision and generality of results.

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4. A Study of Trade Name Confusion *

Joseph Weitz

Occasionally the situation arises where one company feels that the name of another company is so familiar as to lead to confusion by the public. When this situation arises, the older company may believe that the name chosen by the second company was selected in order to trade on the reputation of the more established concern. Legal action is frequently taken with the hope that this action will lead the second company to change its name.

One of the problems arising in this situation is that the company which is instigating the action must show that there is "the likelihood" of confusion between the two names. Nowhere, to the writer's knowledge, is the meaning of "likelihood" spelled out nor are any generalized situations described where, if confusion occurs, the findings are acceptable in a court decision. The problem that arises is how to test the likelihood of confusion.

The following study is reported as a possible approach for companies confronted with this problem. These procedures were devised to study the likelihood of confusion between the names of two companies which we shall call Company A and Company A′.

Company A is an old, established firm. A new firm unrelated to Company A, but producing a similar product was formed and named itself A′. Firm A felt that the name chosen by A′ would lead to confusion in the minds of the consumers. The consumers of the products of both A and A′ were the general public and purchasing agents in the manufacturing plants. Two procedures were used to test the likelihood of confusion between these two names.

Procedure 1: *Recognition-Confusion.* Three samples of the general pub-

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lic were chosen in the East, the Midwest, and the Far West. No attempt was made at probability sampling in any of these regions, since the purpose of the study did not demand this type of sample. The only requirements for the inclusion in this sample were that the respondent be a male and between the ages of 20 and 60. (Men were used since the names of these companies would be more familiar to men than to women.)

The first procedure may be thought of as the Recognition-Confusion procedure. An interviewer handed a respondent a list with ten company names on it and instructed him as follows: "We are doing a survey of familiarity with company names; will you please study this list for a few moments?" The respondent was allowed to look at the list for at least 20 seconds. After he had studied the list, it was taken away from him and a second list with twenty company names was handed him with the instructions: "Now, will you please check the names of the companies which were on the first list and those which were not." (This form had one column headed "On List" and another headed "Not On List.")

Four different conditions were used in this part of the study.

1. Company A appeared on the first list, but did not appear on the second list; however, A′ appeared on the second list. The purpose here was to see whether or not the respondent thought Company A′ appeared on the first list. If so, it was felt that this indicated confusion.

2. The procedure here was similar to that in condition 1; however, A′ was on the first list and A on the second list.

3. Again the procedure was the same except that A appeared on both the first and second lists. The purpose here was to see whether or not it was difficult to recognize and identify the name of Company A. In other words, this was a control situation.

4. This was also a control situation in which A′ appeared on the first and also on the second list.

Results of Recognition-Confusion Technique. Condition 1. Eighty-five people were tested with this condition. Forty-two of them (49 percent) showed confusion. That is, they identified A′ as being on the original list when actually it was Company A.

Condition 2. Eighty-six people were tested with this condition. Forty-six of them (53 per cent) showed confusion. That is, they reported seeing Company A on the first list whereas in truth it had been Company A′.

In order to determine whether or not those who confused Company A and Company A′ were different from the group who showed no confusion, an analysis was undertaken of the number of errors of omission made with respect to the other companies on the list. For conditions 1 and 2 the respondents who did not confuse Company A and Company A′ made a total of 168 errors, whereas the group who showed confusion between Company A and Company A′ made a total of only 153 errors. This is obviously not a significant difference, but certainly it does indicate that

those who confused Company A and A′ were no more confused about company names in general than those who did not confuse the two. There is also no significant difference between the number of individuals in the two groups who erred in the direction of saying companies were on the first list when they were not (that is, companies other than A and A′).

The two control situations, conditions 3 and 4, where Company A appeared on both lists or Company A′ appeared on both lists, resulted in very few errors in recognition of either one. For condition 3, twenty-two people were tested and only two of them failed to report that they had seen Company A on the first list.

For condition 4, twenty-four people were tested and only three failed to report that they had seen Company A′ on the first list. These findings would indicate that either name A or A′ is not particularly difficult to recognize and recall. In fact, in these control situations, recognition on both was just as good as recognition of the other company names.

Procedure 2. *Indication of Company Names.* The second approach used in studying this problem was undertaken with purchasing agents and buyers of manufacturing companies. All companies used in this part of the study were clients of Company A, but not necessarily of A′. This factor, if anything, should have reduced the possibility of confusion between the two companies.

In order to cover the purpose of the study, the questionnaire was put into the framework of a survey on trade journals. In half of the group, the respondent was instructed: "We are doing a survey on trade journals. I would like to *read* you a list of trade journals and have you tell me which ones you look at, which ones you read more carefully, and which ones you do not look at at all." Nine trade journal names were read to the respondent. He was then given these instructions: "Now I would like to *read* you a list of company names. For each company I mention, please tell me whether or not your firm has had any business contacts with them within the last year. By business contact, we mean either that your company has purchased one or more of their products or you have discussed their products with one of the firm's representatives." A list of nine companies was then read to the respondent. After he had said whether or not he had contact or whether he did not know the company, the interviewer said: "I would like to go through the list of those you have had contact with or are not sure of, and ask you to name one product that they manufacture or produce." The second company on the list was Company A′ and the eighth was Company A. All of the interviewers were trained to read all of the company names clearly.

With the other half of the group the same procedure was followed with the exception that the respondent was given the list of trade journals to *look* at, with the same questions asked and then the list of company names with the same questions previously described asked again. This procedure was to test the likelihood of visual as well as auditory confusion.

Forty interviews were held in twenty-one different equipment manufacturing companies. The interviewers were instructed to record all comments made concerning each of the companies.

Results of Company Name-identification Technique. Of the twenty interviews using the auditory approach, nine of the respondents said that they did not know of Company A′ or had had no contact. One respondent said he had contact with A′, but named a product which Company A manufactures but not A′. Ten showed more evident signs of confusion—exemplified by such statements as, "Is that Company A?" on hearing A′ read; or, on hearing the name A′, saying that they had contact with them until the name of Company A was read to them. On hearing the name of Company A, they changed their original response to A′.

Using visual presentation, seven out of twenty showed fairly evident signs of confusion. Again, the confusion consisted of such things as checking having had contact with A′ until the respondent came to Company A on the list, then changing their original response to A′.

It would appear, then, that approximately 50 percent of the sample showed some sign of confusion when the two names were presented verbally, and about 35 percent when the two names were presented visually. Remembering that this is a highly knowledgeable audience being tested, note that even with this group there were signs of confusion.

It is not suggested here that these procedures present complete evidence of confusion or lack of it. These two approaches, however, might be used for evaluating the degree of confusion between two names. Also, the method might be useful with respect to establishment of a name for a new product which is not to be confused with existing products.

5. Seven Fallacies in Marketing Logic *

Fred T. Schreier

It is certainly a triviality to say that management needs information in order to arrive at decisions. It is no less a truism to say that information is a requisite for *wise* decisions. For if there were no information about the state of affairs, the "facts," the conditions under which we are operating, then management would be pure guesswork and gambling.

It is the task of scientific management to make the process of decision

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making more rational and to remove some of the guess-and-gamble. It would be untrue, however, to say that information *determines* decisions. Information is translated into a decision—true, but the movement from information to decision is by no means simple. This article will study and analyze this decision-making process, particularly its logical problems—a rather neglected area in management research.

Inadequate Information. In making a decision, we set certain goals and select certain means for reaching them; we contemplate several courses of action and hopefully select one which will achieve the desired goals. In all decisions, therefore, there are implied predictions about the effects of our actions. And there is also the implication that any decision is superior to merely letting events take their own course without our interference; we always have the choice between action and inaction.

It is clear that purely descriptive information does not help us arrive at a sound decision. If we know how big our sales have been, we still do not know whether a more concentrated effort or heavier expenditures would not have made sales appreciably greater. Nor do we know, the entire marketing situation considered, whether we have only begun to exploit the sales opportunities open to us. Even if we estimate how many people have been reached by our advertising, we do not know whether we have done a good job for the money spent, whether there is still room for greater increases through more efficient use of these advertising monies, or whether the impact of our advertising story can be made more powerful, resulting in greater sales volume.

We can, of course, compare our current efforts with our own past performance or with the accomplishment of competitive companies. These relative measures are frequently all that are available to us, and they are certainly useful. But we need more. In effect, we know that A did better than B, yet we still do not know whether either or both did well or poorly. Or, given purely descriptive figures, we cannot say whether we can improve them, or how they will be affected by a certain type of action.

Differential Description. One way out of this impasse seems to be the use of "differential description." By this process, sales figures are broken down by geographical areas, or customers are classified according to age, race, income, and so forth; and the figures are compared. However, the question again is: What do we learn when we find out, for example, that some geographical areas show higher per capita sales than others? Or we might find that sales are higher among the rich than the poor, among the old than the young, among the educated than the uneducated, among skilled workers than unskilled.

But can we, on the basis of such findings, now decide where to concentrate our efforts? Can we decide, on the basis of this kind of differential description, what course or courses of action are likely to yield the greatest successes for our company?

I will try to show the "logic" of this and other types of analysis, and to point out the assumptions that are involved. I will also try to indicate wherein these assumptions are faulty, and what other kind of information, facts, or theoretical substructure is required in order to put our decisions on a sound, logical basis. One way to cut through the problems is to think in terms of avoiding fallacies, and I have gathered these together under seven main heads:

The fallacy of strong versus weak.
The fallacy of the self-measuring image.
The fallacy of the most frequent reason.
The fallacy of preaching the well-known.
The fallacy of constant susceptibility.
The fallacy of summating effects.
The fallacy of overestimation from tests.

1. Strong vs. Weak. Suppose that, as a result of differential description, we find that our company's sales are considerably higher among young people than among old. Further, suppose that our company's resources at present are sufficient to support only one effort.

What should we do? Some people might argue that we are weak among older people; therefore, we have to strengthen our position in this group. Others might argue, however, that our best chances of success lie in exploiting precisely those areas where we have already shown strength and that we should therefore concentrate our efforts among the young people by trying to make our strong points even stronger. The first view says that what is below average should be brought up; that what is possible among one group can likewise be done with other groups. The second view is that where success has been achieved in the past, further cultivation will yield even greater returns.

Nonpredictability. But it is simply impossible to make a decision one way or the other on the basis of this type of descriptive information. What we must have is information on which course of action would bear the most fruit. We must predict, therefore, the probable effect of each course of action, so we can compare the two results and decide on the better one. Unfortunately, these predictions cannot be made simply on the basis of the differential descriptions. It could be the case:

That the market among younger people is already exploited to its fullest capacity, and that further efforts among this group would yield only negligible rewards.

Or (the opposite) that older people, for one reason or another, dislike our product to such an extent that we have already done as good a selling job among them as we could reasonably have expected to do; and, again, further efforts among this group might prove to be of little or no value.

Or that our weakness among older people is simply a reflection of poor

media choice, and that some new or changed advertising strategy would produce great rewards from this group.

Or (to come full circle) that even among young people we have only begun to scratch the surface, and that there is still great potential for our company among this group.

All of these are possible cases, and in none does the purely descriptive information show what is most likely to be the actual outcome. It is clear that other information is needed, information which will help to predict which course of action we must take.

Searching Questions. Here is a case in which the original decision made by management was misdirected but then, on the basis of new information, corrected:

A manufacturer for whom we worked made a soap which was found to have better sales among lower income people. This was determined by precisely the type of analysis we have been considering. In this particular case, management was partial to the idea that under such circumstances, the correct decision was to make the weak stronger. It was therefore decided to "trade the soap up" by attempting to appeal to people in higher income brackets.

A new series of ads was developed, showing the soap being used by obviously high-income people. A close check during the next few months revealed no effect from this advertising in terms of sales, and no appreciable change in consumer attitudes. There was little reason to believe that continued efforts along this line would have any effect.

The wasted effort could have been avoided if the question had been asked: Is there a real possibility of converting higher income people to the use of the soap; in other words, can sales to these people ever parallel the sales to lower income consumers? (It seems perfectly obvious, in retrospect, that if the situations for these two classes of consumers were really different, there would be no reason to expect similar results for both of them.)

In order to answer that question, it was necessary (a) to determine the extent to which favorable attitudes toward this brand of soap were distributed among the two classes of people, and (b) to determine the extent to which these attitudes led to the purchase of this brand of soap. As it turned out:

A consumer survey showed that, in general, the higher income people included a very much higher proportion of those who objected to the specific odor of the soap, while among the lower income consumers these objections were restricted to a comparatively small ratio of people. There was no evidence suggesting that even a minor product change would be able to do the trick, and there was, of course, very considerable danger that such a change might alienate present customers. In addition, there was still a very large potential among the lower income consumers, since the brand share among this group

was still only about 20%, and a fairly sizable proportion of them had never been reached by advertising.

As a result of these new findings, and a favorable experience with the latest advertising campaign, the company decided to make an attempt to exploit more fully the lower income market by increasing the advertising budget for this purpose. Although only modest gains were made, the increase in sales showed the reversal of decision to have been a wise one.

2. Self-measuring Image. The problems of image research are more subtle. The usual type of image research results in a table indicating the frequency with which certain items are associated with a product or brand. For example:

60% associate our brand with truck drivers.
40% associate our brand with doctors.
30% expect to find it in high-class outlets.
70% think our company is friendly.
32% think our company is progressive.
19% think it is old-fashioned.

But what do these figures mean? Is it good if a majority of the population associates our brand or company with high-income people, or is it better to be identified with the "average guy"? Should our brand be more closely associated with men, or should it be associated with women? Is it better that more people think we are progressive than consider us conservative and traditional? And what per cent of association with any or all of these items is good? Should it be 80% or 90% or 30% or 10%, or what?

In particular how can we select from these items the one or two or three that will do us the most good? Sometimes, of course, it may be easy to decide that a certain characteristic is favorable, or at least more favorable than some other characteristic; for example, it is clearly better for bread or eggs to be fresh rather than stale. But most characteristics in product and image research are "noncommon." Some people like a strong taste, and other people want a mild taste. Some people would like to be identified with classes higher than they feel they belong to, while others would rather be identified with their own class. Some people look on the leaders in their own class as models to be emulated; other people make glamorous or celebrated personalities their models.

Information Gap. Usually we cannot simply decide, without further information, whether an image item (or component) is good or bad, favorable or unfavorable. For example:

In advertising cigars, is it effective to create an image of a cigar fit for the boss? In a study of the cigar market, we found that cigar smokers did not tend to prefer the brand that their bosses smoked. And even this statement is an overgeneralization representing a kind of average finding, true for some brands

but not true for other brands. It was true only that most smokers did not feel that they wanted to smoke the same brand as their boss would smoke; however, for very specific groups in the population and for specific brands of cigars, this did act as an important image characteristic in the sense that it appeared to be a powerful motive for purchase of these specific brands.

The impression of an office may be important, but does the lavish outfitting of an office or the size of the teller's room in a financial institution create the impression of success, confidence, and reliability that makes people inclined to patronize the organization? Or is it more favorable to create the image of thriftiness and careful husbanding of means that is evoked by simplicity of design? A study of the image of a financial institution revealed that there was a certain amount of resentment by savers at seeing their institutions build imposing structures and big offices, thus counteracting the image of confidence. A heavy ornamental door leading into the bank was literally an obstacle to applicants for loans.

In both cases there is a gap in the available information, a gap which has to be filled by further analysis rather than by arbitrary assumptions regarding the favorability or unfavorability of the various image components. We must look for other criteria.

3. Most Frequent Motive. All of the measurements that we have discussed so far refer only to descriptive information. They show the frequency with which a certain act is performed, the proportions of people who hold various attitudes, the numbers who associate such and such an item with this or another brand, or the proportions who state a preference for one or another brand, product, or company. Now, however, we will try to take the argument one step further by turning to the *explanation* of behavior or attitudes.

Many properly conducted motivation studies result in what might be called a "motive list." This is a list of the frequency with which respondents are presumably motivated to perform some kind of action of interest. For example, so many tell us they bought a dress because of its style, so many because of price considerations, so many because of color, so many because of the material, and so many because of the brand name or the shop from which it came.

As in the case of purely descriptive information, we must ask again this question: How can such explanatory findings be used as guides for prediction and decision?

Very often, we hear statements to this effect: "If I only knew why my customers buy my products and why other consumers buy my competitors' products, then I would know what to do to improve my market position!" As if decisions followed automatically!

Interaction Into Action. Unfortunately, however, there is no easy way of translating such exploratory findings of interaction into action, even if management knew the answers to every *why* question. Often, it is simply argued that the most frequently mentioned reasons also represent the most

powerful motives and so should guide future marketing strategy. If, for example, most people buy in a store because of style, then this idea of style should be stressed in advertising, layout, window displays, and the assortment of merchandise. Again, such a conclusion is not logically justified since it is possible to reason in exactly the opposite manner, as the following example demonstrates:

A study we recently completed revealed that most of a store's customers bought there because of its lower prices, and that very few women thought of it as a "style house." The question that came to management's mind is again very similar to those we have already discussed: Should the store now try to emphasize style—say, by prominently displaying high-price dresses in its windows? But such a move could result in the alienation of some "price customers" who might come to think that the store was no longer interested in their patronage, while at the same time it might not be convincing enough to get any "style customers" to think that they now had a new store in which to do their shopping.

Therefore, just as the frequency of image association is insufficient, so also the frequency of a reason or motive is insufficient as evidence for prediction and decision. We have seen that purely descriptive information brings with it no evaluative criterion by which we can determine whether the associations are good or bad, better or worse, and so on. And, in the same way, a list of motives does not indicate to us the potential which can be achieved by trying to exploit any of these motives more fully. The most frequent motive may already be exhausted; the least frequent motive may not be capable of further extension.

Preaching the Well-known. Even if we have the correct measurements of the motivational power of some factor (such as style, price, and so on), there are further pitfalls to be avoided. Suppose, for example, we know the factor that has had the greatest influence in persuading people to buy a specific product or brand. Should we now use this factor as an appeal in advertising or in other ways?

It is in the specific area of pre-evaluation of advertising copy that insufficient attention is paid to the problem of the extent to which the public is already aware of the feature on which the appeal is based. Obviously, if everyone already knows that a certain product or brand possesses a distinctive characteristic (e.g., taste, use, service, gratification, or what not), it might be entirely unnecessary to use an appeal based on this feature, even though originally it was precisely this factor that made the success of the brand possible.

A striking case of this type is what happened with instant coffee:

When instant coffee was first introduced to the market, a considerable amount of the promotional effort was devoted to making the housewife aware of its new *convenience,* its ease of preparation. In line with the growing tendency of the market to consume greater quantities of such convenience

items, instant coffee was winning an increasing part of the total coffee market. However, this convenience theme continued to be used for some time after surveys indicated that almost all housewives were persuaded of it. In addition, there was now considerably more brand competition, and convenience was a factor common to all brands, hence not useful for any one company to feature.

Power $\times$ *Potential.* Of course, not all cases are as clear-cut as that. But in almost any situation the fact is that only those who are not aware or are not convinced represent the *potential* for any appeal. If several appeals are under consideration, which is the best one? Speaking mathematically, we must consider the product of motivational power *and* potential. The optimal appeal will be the one for which the product of these two factors is the greatest. Thus, an appeal with high potential and low motivating power may turn out to be better than one with high motivational power but low potential. For example:

Suppose there is a theme on which 90% of the housewives have yet to be convinced. If 10% of the 90% yet unconvinced were, in fact, motivated to buy our product, this would yield a potential of 9%. Now assume, on the other hand, another theme about which only 10% are unconvinced. Even if we did a remarkable job and, armed with a very powerful motive, influenced 50% of the newly convinced to buy our product, we would obtain a net yield of a potential of only about 5%—compared with 9% for the less powerful motive with the greater potential.

5. Constant Susceptibility. But even the joint consideration of motivational power and potential is not the full story. Again, involved in this reasoning is an assumption which is not often made explicit.

First, we want to convince consumers of some argument or theme; and, second, on the basis of that conviction we want them to act in a certain way. We have already found, by one means or another, that when consumers are convinced of this argument, a certain proportion of them will buy the product or brand in which we are interested. The assumption now is that if we can convince the remaining consumers of the argument, a like proportion out of this remainder will also be motivated in the same way.

Putting the assumption in this bold way, however, makes it quite clear that very frequently the assumption may not be warranted, since those who are not now convinced may (a) find the argument unconvincing, or (b) even if convinced, react differently than expected. In other words they would not buy in the same proportion as those originally convinced. By way of illustration:

A certain patent medicine which we studied made claims of beneficial effects for those suffering from arthritis, rheumatism, stomach disorders, weariness, and a variety of other disorders. A small proportion of the population was convinced of the merits of these claims. Among this small proportion almost everyone bought the products, either with regularity or for special occasions.

However, the study also showed very little possibility of persuading the

vast majority who remained that these claims were justified. Most people were not "susceptible" to these claims—they could not find them believable, and the indications were that it would have been almost impossible to convince them.

Advertising Exposure. This problem becomes particularly crucial when one considers expanding the use of different advertising media. Suppose, for example, we have found that magazines have been more effective than newspapers in advertising some product. Does this finding allow us to conclude that we should concentrate on magazines rather than on newspapers? It could be that even though we expand advertising in magazines, the people *newly* exposed will have no interest in the product; on the other hand, among newspaper readers there actually may be people who would react favorably if further exposed to the argument. Here is a more specific illustration:

> Consider what happens if through additional media we now reach people who had not formerly been exposed to advertisements for fishing tackle. Certainly they will not behave in the same way as those previously exposed. People with an interest in fishing as a sport are more likely to go out of their way to read media where fishing tackle ads are likely to appear, and they are also more likely to look at the ads with initial interest and to have belief in them. That is, those who are interested in fishing tackle ads tend to expose themselves and to convince themselves. As for those who are not interested in fishing, while increased promotional effort may serve to kindle an interest where before there was none, it will hardly get them to buy in the same proportion as those already preconditioned favorably toward fishing as a sport.

6. Summating Effects. In the preceding sections we have been primarily interested in determining which *one* of several factors should be selected as the most effective. However, sometimes our actions are not so severely restricted, and we may have the opportunity of using a combination of appeals or themes rather than only one—just as we use combinations of advertising media in the hope of achieving better results when some group of individuals is subjected to several exposures. But can we be sure that we will get better results from using two or more themes simultaneously?

Even if we know exactly the effect of each argument, we cannot say that the combined effects of the two will be the sum of their separate effects. Actually the combined effect may be either larger *or smaller*. Of course it may be that only after being subjected to a combination of arguments will people become interested or become convinced, and then take the desired action. That is, while one argument or appeal may have only little motivating power, a combination of appeals may "clinch it." But it is also possible that there may operate a law of diminishing returns.

$1 + 1 = \frac{1}{2}$

Sometimes it even happens that two arguments or appeals may simply be incompatible and have a boomerang effect. Remember the old joke: chocolate is very good; cucumber salad is very good; how wonderful, therefore, must chocolate-covered cucumber salad be! Here is an example of how ineffective the result may be of combining two inherently attractive appeals:

> In a recent study that we made of driver preferences for gasoline stations, we found two features or characteristics which seemed to have high motivational power. If the driver thought that a specific station was likely to give "quick service," there was a fairly high probability that the driver would stop at that station if he were on the road. We also found that if the driver felt that there was "lots of equipment" at a station, there was likewise a fairly high probability that the driver would stop there if he were on the road and in need of gas.
>
> However, if he felt *both* that the station was the kind that would give "quick service" and that it was a station with "lots of equipment," then the probability was lower than for either of the two features separately.
>
> An exploration into the reasons for this behavior indicated that if all the driver wanted was to get in and out of the station quickly, he would be likely to choose a "quick service" station. But if what the driver wanted was to have great care and attention given to his car, there was a good likelihood that he would choose an "equipment" station. But those stations which were characterized by both of these features satisfied very few drivers—the feeling being that, where there was lots of equipment, one could not really expect quick service; and where there was the appearance of quick service, there was less likelihood of great care in spite of the equipment.

7. Overestimation from Tests. As I shall point out shortly, there are ways to cut through these informational dilemmas—these ways of making decisions incorrectly because there is a deeper level of facts that must be analyzed first. But even if contemplated action is experimentally tested in the market (which is often proposed as the only, final way to be sure), there is a fallacy to be avoided—that of overestimation.

Among the standard procedures for product tests is the distribution of samples of a new product to a group of testers either in "monadic" procedure or in comparison. In monadic procedure, only the new product is distributed and the testers indicate how they like it and whether they would be likely to buy it after trial. In comparison tests, however, a company's new product is distributed by the tester for comparison with the company's old product, or the company's new product is compared with a competitor's product. From the monadic test, we obtain only one percentage figure—how many of the testers like the product, or how many intend to buy it. With comparisons, on the other hand, we obtain at least two figures: how many like the one and how many like the other—that is, percentages of preference for the one and for the other.

How can these findings be used as a basis for management decisions? Here we must clearly distinguish between two problems: (1) whether

or not the new product should be brought out, and (2) if it is to be marketed, which variety should be chosen.

The second decision can be based properly on product tests. If one variety is preferred by a higher proportion of testers than the other (possibly taking into account the rate of consumption that can be anticipated), then this is clearly the variety to be marketed. However, it is far more difficult to come to a sound decision on the initial question of whether to go ahead at all.

Obviously, the problem as to whether a new product should be marketed depends on the anticipated sales volume, which must be large enough to exceed the break-even point. If the new product is preferred over its competitor by a majority, this may be taken as a good rough indication that it will stand up in competition. However, it does not necessarily follow that if only a minority of the testers prefer the new product over the competitor's product, the opposite decision, to reject this product, would be justified. The preference figure for the new product, even though much smaller than for the competitive product, may nevertheless be taken as *some* indication of an existing segment of the market for the product—the question is still open whether it is big enough.

Telescope Effect. In *no* case can the preference figure itself be taken as an indication of the sales volume to be expected, or of the "sales potential." We are not concerned here with the problem of the reliability of respondents' statements, particularly their expressions of preferences and intentions. Even if we assume that such statements are perfectly valid, there is a further problem: in a product test we "telescope"—that is, by the nature of our experiment we accelerate the marketing process by artificially making the public use the product under consideration, instead of waiting for the actual market reaction. This means, in effect, that the preference figure holds only if in the actual market operation *everyone* will try the new product—which is hardly possible, particularly in the case of mass consumer goods.

The preference figure can only be considered an upper limit and must be adjusted by measurement of the anticipated ratio of triers in the market. This ratio can, of course, be influenced greatly by the amount and quality of promotion put behind the new product, but in no case will it be anything like 100%. Many buyers are conservative and not interested in trying out new products or brands. Even when samples of the new product are distributed house-to-house, there will be people who simply do not bother to try the new item. Accordingly, the sales volume to be expected is a product of its consumer appeal and the trying ratio.

Conclusion

These, then, are the seven widely occurring fallacies in the interpretation of surveys. In all of the cases presented, futile attempts are made to

discover clues for action from findings which are simply insufficient bases for decisions—although they may be necessary, but only partial, premises for arriving at such conclusions. Even most recent image studies are deficient in their attempts to translate their findings into guides for action. The findings must be supplemented by additional knowledge, by measurements such as motivational weights and predictions concerning future situations beyond those obtained from the survey.

Scientific Analysis. Basically this means applying a general principle of scientific analysis in market research: to observe the difference in the effect between situations where a condition is present and where it is absent. The greater the difference, the stronger is the power of the condition —and we can then select the most powerful one. Thus:

In a study of the reasons why people save in a specific type of financial institution we determined the strength of possible motives, such as the specific purpose for which the individual saves, the feeling of guilt for not saving, the feeling of gratification after having saved, the imitation of the father's saving habits, social responsibility for saving, and others. These motivational factors were related to the amount saved, eliminating side factors such as income and number of children. The strongest appeal could be chosen, and was successfully applied in an advertising campaign.

Correlation analysis was the method used in the above case—as it was in the other studies cited throughout the article where additional measures had to be obtained for a sound decision. Actual market experiments can also be used, either as an alternative or as a further test of the cause-and-effect relationships indicated by correlation analysis. As a final example of the need to peel back layers of information by such methods, take this characteristic case:

A brand of beer was found to be well-accepted by heavy drinkers, but not by light drinkers. Management raised the question whether efforts should be made to increase the brand share among the light users. A sound decision could be reached only after a full analysis of the situation which would give clues to the possible success of a product change that would make the beer lighter.

There was reason to believe that lighter beer had greater appeal for lighter drinkers. But, at the same time, it was necessary to establish another measurement—the extent to which heavy drinkers would turn away from a product that was not exactly to their taste. The information collected pointed to a decision not to make a product change because the gain resulting from the attraction of light drinkers would not nearly outweigh the possible loss from the dropping-out of heavy drinkers.

However, this decision was proper only in the specific situation where there were in the market a number of brands of the same character of beer, so that the drinkers who wanted a heavier beer could switch to these brands and find what they wanted. This factor had to be considered in the prediction, so further information was needed.

In another survey we conducted, the general outline of the situation was similar. But it turned out that there was no other brand then being marketed which had such a heavy flavor. Since those who wanted a heavy taste would not be able to find another brand to switch to, the decision was reached to make a modest change in the product in the direction of lightening it. An investigation of the market situation afterwards showed that, while there was some dissatisfaction among the heavy users, they had remained with their favorite brand. At the same time, the modest change had been successful in attracting a moderate number of light drinkers who had previously found the brew too strong.

Scientific Management. I have not attempted to discuss in detail the methods of correlation analysis and experimental design by which the necessary additional information (in the form of measures, weights, predictions) can be obtained.[1] Suffice it to say that an attempt must be made to determine how a change in one condition (which can be manipulated) influences certain effects such as preferences, desirable attitudes, sales, and so on. However, as long as research does not take this painful road but confines itself merely to the simple measurements of the type described in the seven fallacies, the main contribution for decisions must come from the intuition and enlightened guesses of management, with research playing only a minor function in the decision-making process.

It may be objected that it is sometimes impossible to obtain this required knowledge, and that it is actually very difficult to obtain the needed knowledge even by using advanced research techniques. However, the task of scientific management is always to strive for better and more reliable measurements, estimates, and predictions. Even when we have insufficient bases for decisions, we must at least make explicit, and be aware of, the assumptions by which we try to fill the gap in our knowledge, rather than trying to squeeze clues out of information from which such clues simply cannot be determined.

In short, we must attempt to improve decision making by rational procedures, decreasing our reliance on enlightened guesswork by critically examining assumptions and replacing them with knowledge derived from better analysis.

[1] See my *Human Motivation—Probability and Meaning* (Chicago, Free Press, 1957), especially Part III.

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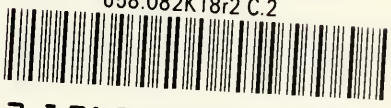

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